The
Electrical Review

VOL. CX. MARCH 4, 1932. No. 2832.

THE OLDEST ELECTRICAL PAPER. ESTABLISHED 1872.

Published every FRIDAY, Price 6d.

THE ELECTRICAL REVIEW, 4, LUDGATE HILL, LONDON, E.C.4.

Telegraphic Address: "AGEKAY, CENT, LONDON," Code, A B C. Telephone No.: Central 8871 (5 lines).

The "Electrical Review" is the recognised medium of the Electrical Trades and has by far the largest Circulation of any Electrical Industrial Paper in Great Britain.

SUBSCRIPTION RATES, Postage Free: United Kingdom, £1 14s. 8d. Canada, £1 12s. 6d. Colonial and Foreign, £2 1s. 6. per annum. Cheques and Postal Orders (on Chief Office, London) to be made payable to E.R. (1930) LTD., and crossed "Lloyds Bank."

For List of Foreign Agents for the ELECTRICAL REVIEW see Advertisement Supplement.

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Our Changing Industry

WE believe that the improvement that is reported this week in the affairs of the English Electric Company, Limited, will be almost as welcome to the electrical industry as a whole as it will be to the holders of the securities of the company.

Much has happened in the fourteen years that have elapsed since the first great amalgamation of electrical interests took place as the company came before us in 1918, effecting a combination of Dick, Kerr & Co., Ltd., Willans & Robinson, Ltd., the United Electric Car Company, the Coventry Ordnance Works, and the Phœnix Dynamo Manufacturing Company, with the addition in the following year of the Stafford establishment of Siemens Brothers Dynamo Works, Ltd.

The whole venture was a new one, and its course was watched with growing interest from year to year as the concern established throughout the world a good name for heavy electrical engineering products.

One cannot but believe that it would have experienced greater prosperity if railway electrification and hydro-electric enterprise had come along when there appeared to be every reason to expect them. The suspension of world developments undoubtedly delayed a good deal of electrical progress overseas. Time, too, may now have proved that there would have been lighter burdens to be borne by the company if, in addition to the heavier lines, there had been various smaller classes of products to level things up.

The reorganisation that took place in 1930 has been followed by a trading profit of £209,394, against only £2,857 in the previous year, and everybody will join us in the hope that there will now be no turning back. The industry wishes for nothing more profoundly than to see all its manufacturers prosperous.

A step that is now being taken by the company indicates the adoption of a new policy which may assist it materially in the almost immediate future. It enters a most promising field by establishing a "Domestic and Heating Section"—a field which means much to practically everybody electrical unless we are strangely misguided in our view of the future. The annual turnover of the class of goods indicated by the name of the section will soon be many times what it has been in recent years if the electricity supply industry makes a really strong pull for it. General industry also will have manifold uses for heating other than domestic—here a good deal has been done, but there is abundant scope as our trades revive.

In choosing as the sales manager of its new department a man of Mr. Gillott's very lengthy experience in the cooker and domestic field the company has done well. If he does not understand his subject—well, nobody does! Many readers will recall his work at Wembley (the British Empire Exhibition), and the spadework which he contributed in connection with the revival of the Electrical Section of the Birmingham Fair.

Last week we alluded to the developments that had been made by a prominent switchgear manufacturer into a new line of production—vacuum cleaners. The English Electric forward movement also shows which way manufacturers are looking as they seek to extend the existing British facilities for production of popular lines of British goods.

Our firms are wisely adapting their activities to the changes that will, we suppose, be inevitable in the industry as it expands to the, at present, indefinable limit of its opportunity.

The National Register

A NEW list of registered electrical contractors (up to December 31st, 1931) which we have received again shows us that, while every part of the country is represented, the representation in some places is very poor—that is, development has been extensive rather than intensive. As we have said before, the National Register has little money available for propaganda, and so the registered contractors should endeavour to raise the status of their business by doing a little missionary work in their own districts.

We appreciate the fact that registration gives a contractor a certain distinction which he may like to bear alone, but we think that this is a rather unwise attitude to take up. Until the general level of installation work can be raised in every district, the good contractors will suffer from the depredations of others whose lower standards enable them to quote inordinately low prices. Running through the new list we are struck by the number of towns of considerable size in which there are only one or two registered contractors. On the other hand, we note other places where the registration idea seems to have borne good fruit. These, we feel, are the towns in which those who were already registered have had a full sense of their obligations and interests, and have persuaded others to "join up." Theirs is an example to be followed.

Lamp Prices Reduced

THE action of the National Government in imposing duties on imported electric lamps has already brought advantage within the reach of electric lighting consumers everywhere. On Tuesday, March 1st, members of the Electric Lamp Manufacturers' Association of Great Britain, Ltd., made a general reduction in the list prices of general lighting service lamps, because it is certain that the import duties will promote increased production and increased sales of British-made lamps. Immediate reduction was decided upon in anticipation of these effects. Announcements by various manufacturers will be found in our advertisement pages, and more detailed particulars appear in our "Business and Industrial Notes."

Effects of the Drop

A GENERAL reduction in lamp prices is always a very popular event, for it gives an impetus to the whole lighting industry. The mere knowledge that electric lamps are cheaper to-day than they were a few days ago has an excellent effect upon the mind of the general public. The consumer's disposition to let an exhausted lamp last a little longer—until it actually fails—more readily disappears if it is known that the lamp costs less. The benefits of better lighting are then appreciated. If only the millions of lamp-users could acquire the more-frequent-changing habit they would hasten further price reductions. Uniformity of policy has made the present general drop in prices possible. The reduction has come at a most suitable moment.

Export Trade

WE wish to direct our readers' attention to the article on another page in which Mr. H. C. Siddeley, who leaves for Argentina in the course of a few weeks, shows why some of our earlier co-operative electrical export trade ventures have not succeeded; he also states what, in his opinion, are the methods by which grouped manufacturers may do better to-day. Another writer, Mr. W. T. Taylor, who has had a very lengthy experience in organising and managing electrical engineering undertakings in Mexico, Brazil, Bolivia, Chile, and Peru, writes upon the Trade Situation in Brazil, giving us the benefit of many years' practical work in that country, where, while connected with foreign firms, he did not fail to use his endeavours in favour of British manufacturers. In this way he learned both sides of the foreign competition problem, and his advice merits close study.

The "T.C. and M."

WE can well imagine that submarine telegraph men who began their career in the Victorian era when cable-making research and cable-laying adventures and exploits were the most prominent part of the electrical industry, and who are still amongst us, found it necessary to gulp down their feelings as they listened to the speech of the Earl of Selborne at the annual meeting of the company so familiarly known as the old "T.C. & M." Firm as a rock it stood decade after decade, always prosperous, with some of the most distinguished cable pioneers on its board. Our leading article to-day deals with "Our Changing Industry," and the experiences of the Telegraph Construction and Maintenance Co. provide one of the signs of change. Formed sixty-seven years ago (in 1864), it has paid a dividend every year until now, and Lord Selborne was not exaggerating when he described this as a wonderful record.

What of the Future?

THE year 1931 was quite devoid of all enterprise in submarine cables, and only a few maintenance repairs came the company's way. It is a very long time since the prophets interested in wireless predicted the supercession of the cable, and the cable industry is far from dead now if Lord Selborne and his board read the signs correctly. They hold that submarine cable orders in the future will be important, but more intermittent than in the past; when world depression passes away, important orders will come, but the new cable business will be very different from the old. The amalgamation proceedings of 1931 broke down, but an important reorganisation step is in contemplation, namely, to concentrate all the company's works at Greenwich and wait for orders.

A New Association

FORMER members of Mr. R. P. Sloan's staff, who owe so much to their hard training in the bracing atmosphere of the North-East Coast, will be glad to hear of the formation of an association (the "Nescoe") to keep them in touch with each other. Its influence will be world-wide, as its potential members hold responsible positions in the electrical industry not only in Great Britain, but in every part of the Empire.

Engineers' Reticence

THE note of criticism running through the speeches of the guests of the Association of Consulting Engineers at its annual dinner defined what, both in and out of the profession, is sometimes asserted, namely, that engineers are too reticent to obtain their fair share of publicity abroad for their achievements. The Association itself seeks to regulate behaviour between individual engineers, and any implied criticism of its code of etiquette is, we think, beside the mark, since it is the work of engineers as a whole—and not only of consultants—that should be told to the world. A joint committee of the three great Institutions could, no doubt, do much in the way of Dominion and foreign propaganda, but we think the root of the matter is deeper than this. There is in certain cases extreme caution in giving out information on new developments before these have been thoroughly proved. This, no doubt, enhances our reputation for reliability, but it often results in credit being given elsewhere.

Switchgear Rating

IT was a wise decision to allow a second evening for the discussion of Mr. Clothier's paper on "Metal-clad Switchgear." The subject is so bound up with the trend of heavy-power development that all views should be placed on record. But why did not supply engineers give their views as users of the gear? The most important aspect just now is that of rupturing capacity. Mr. Clothier demonstrated clearly the need for standardised performance tests such as those carried out at the Hebburn plant, described in THE ELECTRICAL REVIEW of May 30th, 1930. In this issue Mr. Ferguson draws attention to the recently recognised importance of test circuit characteristics, which provide an additional reason for standard test conditions. There are three questions upon which we would welcome the opinion of the industry: (1) the need for a central proving station; (2) the buying of circuit breakers on certified tests; and (3) the effect of the position on a system of fault severity. Money will be needed, but it may not be forthcoming until we have decided our attitude on the salient issues.

Electricity in Paper-making

A Large Kent Mill

THE Empire Mill at Greenhithe does not represent the most modern electric driving practice, but there were strong reasons for its selection for a recent visit. It was the first mill to adopt the infinitely variable a.c. sectional drive; the company's engineers played no small part in the development of the system, in conjunction with the British Thomson-Houston Co., Ltd.

When operating at full capacity the mill should produce about 50,000 tons of newsprint annually, and often paper made in the morning is used the same day. The process is continuous from 6 a.m. on Monday to 10 p.m. on Saturday during ordinary weeks. The plant is self-contained electrically, and Mr. Hunt, chief engineer to Empire Paper Mills, Ltd., stressed the point that generation on site is essential in view of the demand for process steam. The mill is situated on a particularly favourable site on the Thames, and is served by a deep-water jetty.

Generating Plant

In the boiler house from each of eight 10,000-lb. Babcock and Wilcox double-drum, land-type, water-tube boilers is being obtained 14,300 lb. of steam per hour at 165 lb. per sq. in. and an average efficiency of 77 per cent. Four 30 ft. by 8 ft. Lancashire boilers serve as stand-by.

The turbine room is equipped with a 2,100-kW straight-condensing turbo-alternator and a 2,500-kW turbo-alternator supplied by the General Electric Co., Ltd., and designed to pass out 20,000 lb. of steam per hour at 20 lb. per sq. in. for process work.

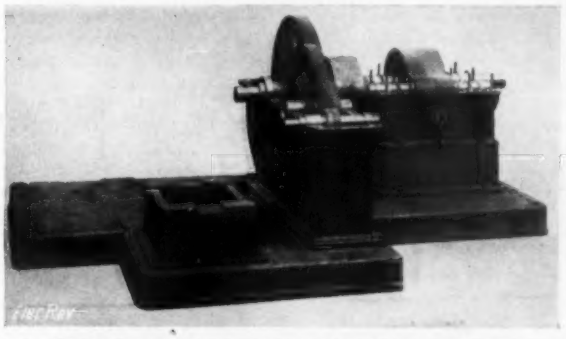
The remainder of the steam is exhausted to the condenser. A 75-kW Browett-Lindley vertical compound three-phase set and a d.c. equipment of the same size are used for week-end running for maintenance and repair work when the mill is closed. All the auxiliaries are electrically driven. The main turbine switchgear is of B.T.-H. manufacture, and the "double-back" distribution switchboard was supplied by Messrs. Crompton, Parkinson, Ltd.

Raw Material and Manufacture

For its raw material the company uses a mixture of mechanical and chemical pulp, i.e., wood disintegrated by grinding or by chemical means (sulphite pulp). The mixture is put into breaker-beaters and pulped up in water by circulation round the beater tub through the agency of the large beater roll. When this process is finished the pulp is passed through refining engines for final treatment.

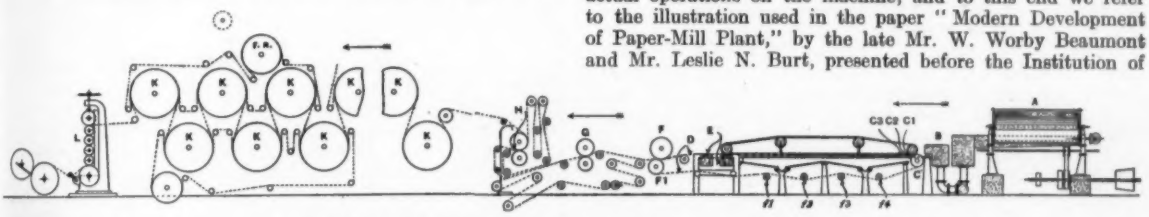
After refining, the pulp and water mixture—"stuff"—is diluted to a consistency of about one per cent. fibre and 99 per cent. water, and then passed through rotary screens to the "flow box" and on to the paper machine. The thickness of the paper depends on the speed of the wire and/or the rate of flow of the pulp.

There are four paper machines in the mill, but for the purpose of this article interest is taken only in the largest and most modern one—that with the electric drive—supplied by Messrs. Charles Walmsley & Co., Ltd. It is of the "Fourdrinier" type and produces paper 210 in. wide at the rate of 80 tons per 24 hours (140-150 reels), or one mile in six or seven minutes. A point of general interest is that one acre of forest produces from six to seven tons of paper.



Reduction gear for sectional drive (cover removed)

To describe adequately the somewhat necessarily intricate driving of a paper machine it is well to explain briefly the actual operations on the machine, and to this end we refer to the illustration used in the paper "Modern Development of Paper-Mill Plant," by the late Mr. W. Worby Beaumont and Mr. Leslie N. Burt, presented before the Institution of Mechanical Engineers in 1926. It should be understood that the machine represented by the diagram is not the same as the more modern machines of the Empire Mills.



Path of material from wet to dry ends of paper machine

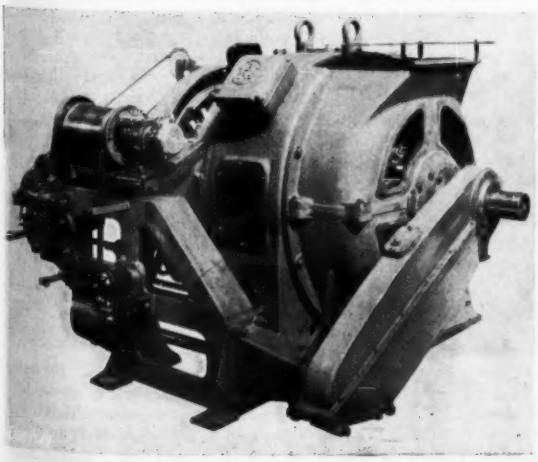
At the extreme right of the diagram are the screens, the function of which is to free the pulp from any particles unsuitable for paper making. From the screens the pulp flows into the breast box B and thence on to the wire which is carried at this point by the breast roll C, the amount of "stuff" passing determining the weight of the sheet to be produced. The wire D is an endless band of woven wire cloth which allows the superfluous water to escape but retains the fibre and "filling."

Below the wire are the vacuum boxes E, the purpose of which is to extract as much as possible of the water still remaining in the pulp. After leaving the vacuum boxes the wire carries the paper through the couch rolls F which still further reduce the wetness of the paper, and, by the moderate pressure exerted by the rolls, consolidate and strengthen it so that it may be in fit condition to leave the wire, which at this point turns round the lower couch roll and travels back towards the breast roll.

The paper now is sufficiently strong to support its own weight for a short span, and after leaving the wire it meets the "wet felt" which supports it and carries it through the "first press rolls" G. Leaving these it travels forward on the felt and is after a short distance transferred to a second felt on which it travels through the second press rolls H.

The next process, drying, is effected by passing the web over a number of steam-heated cylinders K, the paper being held in contact with them by felts. It is then taken to a stack of calender rolls L, which may be said to complete the process of manufacture by burnishing and consolidating the surface. It is then wound in rolls ready for transport.

The starting torque on the dryers and calender sections is very high—the bottom roll of the calender weighs 24 tons, and the starting torque is between five and six times the running torque—barring motors are therefore fitted on these sections.



Driving unit with synchronous motor regulating gear

As the paper passes from one section on to the next the relation (" draw ") between the speeds of the sections must be kept constant. The speeds are not necessarily the same, since the paper stretches as it passes through, particularly at the wet end. Further, the relation must be adjustable, since at different paper speeds, different " draws " are required.

The speed range of the machine at Empire Mill is 400/800 ft per min.

Each of the eight sections (couch, three presses, two dryers, calender and reel) is driven by a type CHT variable-speed a.c. commutator motor through a reduction gear. The reduction gears are double helical gears manufactured by the Power Plant Co. The barring gears on the dryers and calender sections drive the high-speed shaft of the main reduction gear through an over-running ratchet clutch, and the slip-ring barring motors are shut down when the main motors are running. The speed of the main motors can be adjusted to the desired value by moving the brush rings in opposite directions on the commutator.

Speed Regulation

Regulating gear is fitted to each section driving motor, and its chief purpose is to maintain constant the speed of the driving motor. The essential part of the gear is a small synchronous motor having both the rotor and " stator " mounted in bearings and free to rotate.

The inner member is driven from the shaft of the section driving motor, and the outer member is coupled to the brush-shifting (speed-changing) mechanism of the section driving motor, so that if the section main motor is driving the inner member of the regulating motor at its synchronous speed the outer member and therefore the brushgear will not move.

Should the speed of the section motor increase or decrease by the slightest amount, the outer member of the regulating motor would at once commence to rotate (since the difference in speed between the inner and outer member would remain constant), and in doing so it would move the brush-shifting mechanism so as to correct the speed.

As soon as the section driving motor is again driving the inner member at its synchronous speed the outer member will again come to rest. If, however, the frequency of the supply to the regulating motor be altered, the outer member will rotate the brush-shifting gear until the section driving motor is driving the inner member of the regulating motor at a speed synchronous with the new frequency.

Each regulating motor is supplied from a master alternator driven by a variable-speed a.c. commutator motor, the speed of which set determines the frequency of supply to the regulating motors, and therefore the speed of the drive as a whole may be regulated by altering the speed of the motor driving the master alternator by means of a pilot motor.

In order to permit the speed of each driving motor to be varied the latter drives the inner member of the regulating motor through a belt and cone pulleys. The position of the belt on the cone pulleys is determined by a guide pulley carried on a bracket, the bracket being traversed by a hand-wheel or automatically operated by a switch in front of the machine.

The power required for speed control is only that required for moving the brushgear on the CHT motors, and the belts and cone pulleys on the regulating gears are therefore very light, the power used being practically negligible. The correction of speed by the regulating gear is very rapid.

Control Equipment

The drive is controlled from the front of the paper machine. Inching, creeping and running speeds can be obtained on any section by the operation of master controllers which control contactor panels mounted with the motors in a housing running the length of the drive. The motors are switched directly on to the line with resistance in the secondary winding circuit of the motor, the resistance being cut out by contactors as the master controller is moved round. If the controller is moved quickly to the " run " position the resistance " shorting " contactors are prevented from closing too rapidly by current-limit relays.

On the calender and dryer sections the barring motor is started for " inching " and " creeping." The speed of the drive as a whole may be raised or lowered by adjusting the brushgear of the CHT motor driving the master alternator. A magneto-generator speed transmitter is driven from the calender and is connected to a sector-type speed indicating meter mounted in the machine room. Emergency " stop " push buttons are also provided.

In a more modern a.c. sectional drive for a 263-in. (wire) 500/1,250-ft. per min. newsprint machine starting resistances have been eliminated on the main motors, inching and creeping being obtained by barring motors on the dry end and by putting a low-frequency supply from an alternator set on to the main motors at the wet end. Under these conditions the CHT brushgear is in the low-speed position which is automatically gradually raised to the running-speed position when the master controller for that section is moved to the " run " position. The regulating motor has its inner member coupled to the brushgear, and the outer member is driven from the CHT motor shaft.

The sensitivity of the speed regulator is higher than can be obtained on drives using d.c. motors, and is " dead-beat." A sudden change in load does not cause oscillations to be set up, lending to steadier " draws " and generally improved operation. The master speed control is obtained from an entirely independent motor-alternator set.

The motors are directly connected to the main supply system and not to a converting plant of comparatively small capacity, thus making for steadiness of paper speed and permitting the shutting down or the variation of load of one section without affecting the speeds of the others. Voltage regulators are not required. The drying cylinder sections need not be tied together mechanically; each section can be shut down or started up independently, and the relative speed of the cylinder sections can be varied if desired.

Barring gears are provided with the drying cylinder and calender sections, so that the heavy starting torques met with in these sections can be obtained without undue strain of the driving machinery, or undue demand on the power supply system. Provision is made for running every section except the reel at a steady creeping speed for adjustment and cleaning.

The paper machine is fitted with Evershed speed recorders.

Finishing

A rewinding machine takes the big reel of paper from the paper machine, cuts it into suitable widths and rewinds it into smaller reels. It is important that this machine should have a very uniform acceleration, and for that reason the company has adopted the Ward Leonard system of driving with a m.g. set on the a.c. supply.

A final surface finish is given to the paper on a super-calender with positive and negative booster driving to ensure a wide range of speed. The main driving motor, 300 h.p. d.c., is supplied from the 220-V constant-voltage generator of a motor-generator set, in conjunction with a 220-V reversible booster, so that any pressure up to 440 V can be impressed across the motor armature.

The 370-h.p. motor of the m.g. set is an auto-synchronous machine by which the power-factor of the system is improved from 0.67 to 0.82 lagging. The main driving motor is a constant-field machine and is equipped for dynamic braking, so that the calender can be brought to rest from working speed in the quickest possible time to reduce " broke " —the paper unreeled and crumpled before the machine is stopped.

A 50-h.p. three-phase slip-ring barring motor serves during starting and also enables the calender to be run for reconditioning, &c., without having to run the m.g. set. This allows the calender to be run at low speed, so as to allow the threading through of the paper.

Operation of Super-calender

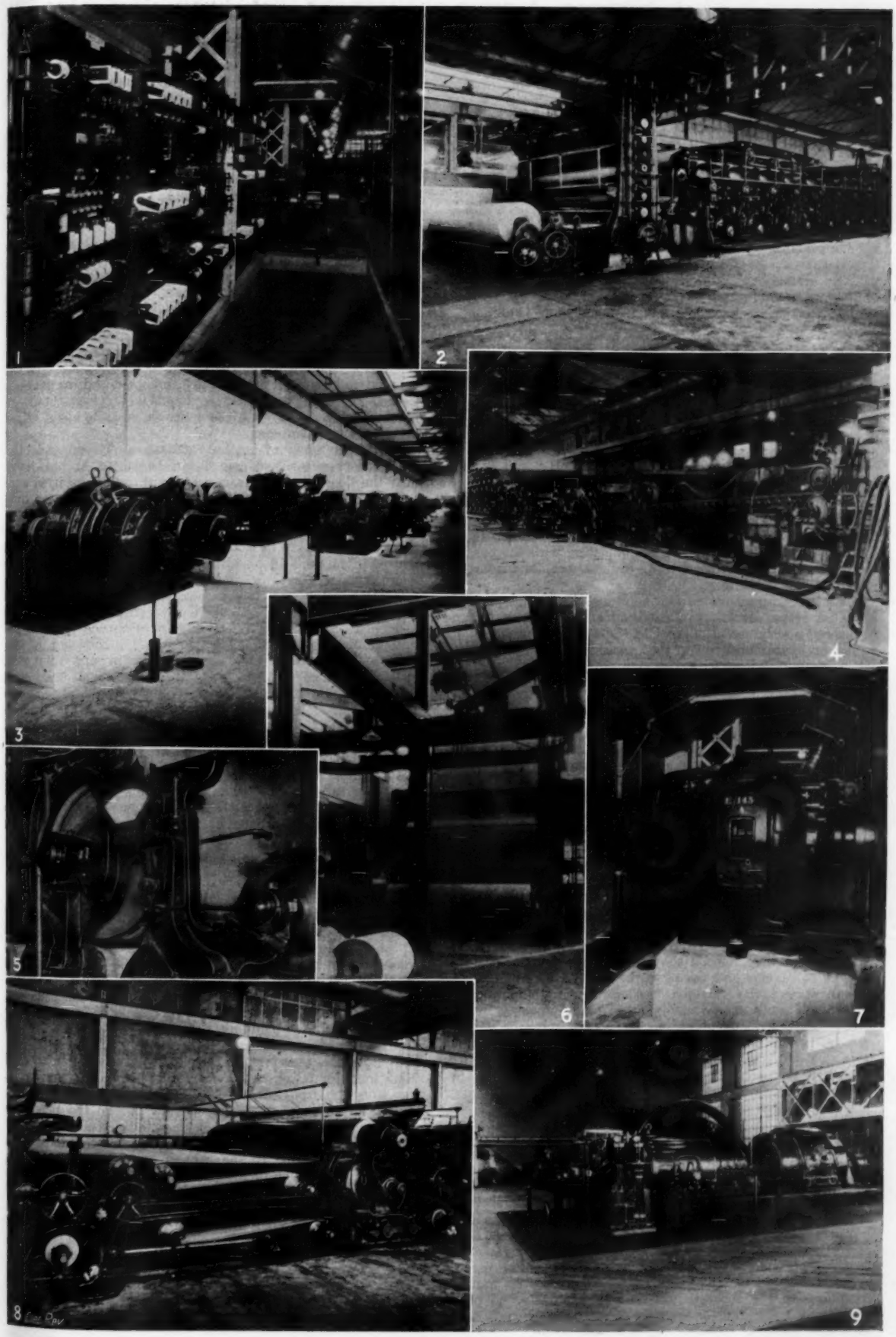
When starting the calender the m.g. set is first run up and then the barring motor. When the latter has attained full speed the main driving motor is started on reversible booster control, and when this motor is up to speed in excess of that of the barring motor, a centrifugally operated free-wheel clutch releases the barring motor from the drive and at the same time disconnects it from the line. The maximum speed of the calender is 1,800 ft. per min., and any speed from zero to that can be obtained.

Messrs. Crompton, Parkinson, Ltd., supplied the whole of the driving machines for the super-calender, which are controlled by Allen, West equipment. The reduction gears and couplings were supplied by Messrs. David Brown & Co., Ltd., all to Mr. Hunt's design.

The modern tendency is to design the constant-voltage generator for the super-calender drive with sufficient capacity to enable it to drive also a d.c. motor for the rewinder, and obtain the necessary speed range by series and shunt regulation—assuming, of course, that the main supply is a.c.

For the handling of the paper reels there are five Royce gantry cranes, each with two crabs and served by five B.T.-H. slip-ring motors—one for travelling (7.5 h.p.), two of the same size for hoisting, and a 2 h.p. traversing motor —all governed by drum-type controllers with unbreakable grid resistances.

There are something like 200 motors all told in the mill, varying in size from 5 to 800 h.p., and representing a total h.p. of about 5,000 h.p. The weekly consumption of electricity is of the order of 250,000 kWh. The mill is equipped with an up-to-date laboratory in which all raw materials and manufactured products are tested.



The Empire Paper Mills Plant

1. Contactor panels controlling reel and calender motors; 2. Dry end of paper machine; 3. Sectional drive for 263-in. newsprint machine; 4. Wet end of machine; 5. Evershed speed recorder; 6. Super-calender; 7. A.c. commutator motor driving third press section; 8. "Draw" between first and second press sections; 9. Pass-out turbo-alternator (2,500 kW).

The Stores Lay-out. By H. R. Taunton

How to keep stock in order and good condition

ALMOST every advertisement of an electrical contracting business for sale contains the mystic initials "S.a.v."—stock at valuation. Evidently, then, stock is to be considered a valuable asset. Yet you will find two out of three of these advertisers have been content to let this treasure rot in a dark, damp, dirty dungeon—which they miscall a "store"—until "at valuation" it is not worth a tithe of what they optimistically expect for it, or indeed, of what they paid for it.

If stock has any worth at all, it deserves a setting of worth. All the organisation and clerical work of Whitehall will not save it from decay and confusion if it is huddled in cramped quarters, ill-planned and ill-equipped. If its depreciation is to be kept to a minimum, the most careful consideration must be given to the practical details of its storage and handling.

Position and Arrangement

The general arrangement of the stores will naturally be affected by the space available and its plan, its height, and the position of doors and windows. The contractor's stores are usually to be found in a basement. The ground floor would be better for convenience of handling, but as a rule the valuable space there is needed for other purposes. The first or upper floors are obviously unsuitable.

If it is in the basement, it must be provided with a convenient opening to the street or yard through which conduit and similar bulky material can be passed, to avoid awkward carrying up and down stairs; and, similarly, a trap with a hoist for heavy goods is very desirable. If possible, there should be two entrances, one communicating with the rest of the premises and the other opening to the street, for the use of workmen and messengers.

The latter, with a suitable waiting space, should be separated from the actual stores by a partition and a counter. If a workshop, a very useful adjunct to the stores, is provided, it should preferably open on to that waiting space and have no direct communication with the stores. Even if no separate entrance is possible for the men, the lobby and counter should still be provided.

Excluding Intruders

There should be a strict rule that only the stores staff (and certain members of the office staff) should be admitted to the stores themselves. It is not always an easy rule to enforce. A harassed store-keeper will often be tempted to let a foreman come in to select some particular item that will best suit his job or to collect his own material, or he will impress a messenger to help him to handle some outward consignment.

Once that sort of thing is allowed, goodbye to all efficiency. The stores is too apt in the best of circumstances to become a mixture of canteen and mothers' meeting, where gaping lads may hear their elders swopping anecdotes at one-and-something an hour. Bad enough if it is confined to the waiting space; but if these gossipers and idlers are allowed to lounge about the stores, they are not only more difficult to dislodge, but they impede the work there and increase the chances of damage and loss of stock.

Even worse is the inevitable breakdown of the organisation. A boy will come in and dump down stuff, probably in the wrong place, without informing the storekeeper; or a man in a hurry will take something he wants and neglect to have it booked out. None but the stores staff, who can be trusted to observe the necessary routine, should be allowed under any pretext to handle stock in any way, in or out, which may affect the accuracy of the records.

Lighting and Equipment

Coming now to the stores proper, these should be dry, well ventilated and well lit; and, of course, the roomier they are within reason the better. Space has to be provided in it for the storekeeper's desk with telephone, and for shelving for his files, advice books, catalogues, etc. A lock-up cupboard is desirable for certain items. A clear space, too, will be needed for packing, with a wide bench and conveniences for packing material. A spring balance for postal parcels and a strong set of scales for heavier goods will be wanted. Assuming that a separate workshop is available, no other equipment is essential for the store beyond such obvious items as a yard measure, foot-rule, callipers, and so on.

Leaving a certain floor area for the bulky items, such as motors, large fans, radiators and the like, which will inevitably, if only temporarily, drift into the stores, the rest of the space has now to be equipped for the most convenient storage of the normal stock. That is only a matter of lining the walls with suitable racks, bins, and shelving. Unless the space is very narrow, other rows of bins can be planned in the central area, leaving suitable gangways, say three feet wide, and avoiding dead ends.

Generally speaking, none of these receptacles should be above hand reach, although if space is limited an upper shelf may be used for items which are rarely in demand. An all-steel construction has certain advantages, lessened fire-risk being the chief. On the other hand, sheet steel shelving for stock consisting largely of cast iron and similar heavy metal goods, although it may be indestructible, soon gets badly knocked about, shabby and rusty. Wood, besides being cheaper, actually keeps in better condition. A compromise of angle iron framing with expanded metal or wire mesh divisions, but wood shelving and ledges, provides the best construction.

Storing Conduit and Accessories

Different kinds of stock clearly need different accommodation. Lengths of conduit cannot be stored in pigeon-holes. It, and capping and casing if stocked, is best kept on horizontal racks formed of wide wrought-iron brackets. They should be planned to be in line with the doorway, so as to avoid negotiating awkward corners.

The larger types of conduit accessories, boxes, and other c.i. goods not easily damaged can be stored in bins at or near the floor level: compartments with solid or slatted wood fronts extending about half their height. At the same time, even this class of goods should not be thrown into bins haphazard, as is commonly done. They will occupy more room than if they are neatly stacked, they are less easily classified and checked, and, particularly if they are enamelled, they depreciate more rapidly, if only in appearance.

General accessories, such as holders, switches, etc., should be stored in similar but shallower bins, more elaborately fashioned, above the floor level. They can have solid, but preferably slatted bottoms, to minimise the collection of dirt, the spacing between slats being narrow enough to prevent any single item falling through. They should have wood ledges in front, to prevent goods being crowded and falling off to the floor. They can with advantage be fitted with an internal shelf about halfway up and extending for about half the depth of the bin.

Further, both the bin and the shelf can be fitted, if desired, with light vertical dividing pieces, which will allow a certain sub-classification of patterns. In storing these small accessories it is desirable to keep them as far as possible in unbroken lots in the makers' original cartons, only odd quantities being kept loose towards the front of the bins. The bulk of the stock will be accommodated in these bins, whether whole or sub-divided, when that can be done conveniently.

The Use of Bins and Shelves

As a general principle, every different type and pattern of material should have its own bin or a separate compartment of one, although in practice there are so many different varieties and makes which may have to be stocked that this ideal, in a store of average capacity, is difficult to achieve. At least it should be aimed at. To mix half-a-dozen patterns of, say, tumbler switches in one receptacle adds considerably to the difficulty of handling, recording, and stocktaking, and leads to errors and oversights.

It is better, therefore, to plan for a large number of small bins than for fewer large ones. They should not extend too far from the front, or the back will not be easily accessible and open to view; and they should not be too deep from top to bottom or the upper space will be wasted, especially with small goods like bushes, saddles, and the like, which cannot be stacked. In the case of articles like screws and Rawlplugs, of which quantities numerically large occupy little space, the bins may become practically pigeon-holes, provided that every part of them is accessible.

Certain articles, such as shades, may be more conveniently stored on shelves, with a sufficiency of vertical partitions, rather than in bins. A shallow guard should be fitted to the edge of all shelves to prevent articles being easily knocked off or working off through vibration. In any case, glass and porcelain goods are always best kept well up above danger of other things falling on them.

Dealing with Cables

Cable, if in unbroken coils, can be stacked in large bins, horizontally for the smaller sizes, but better vertically for the larger. Very heavy cables, and lead-covered or armoured cables, will have to be stacked in bays on the floor level,

(Concluded at foot of next page.)

A Modern Belgian Station

The new Interescaut plant

SINCE the War there has been a notable extension in electricity supply facilities in Belgium, there being now few rural districts throughout the country that are not provided with a source of power for lighting, heating, and other purposes. Not only have a number of new power stations been completed, but they have been so connected together with a network of transmission lines that in case of breakdown and sudden local increases of load stations can quickly assist one another.

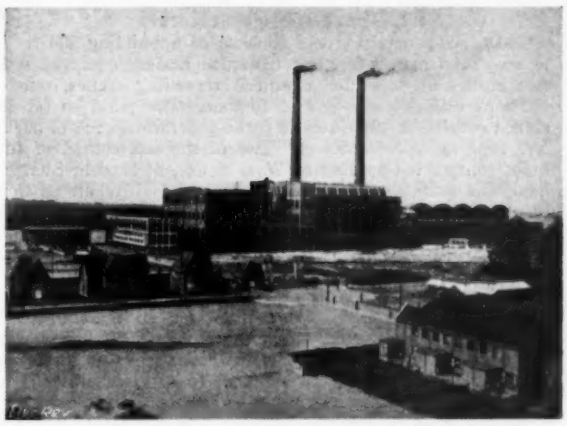
As long ago as 1923 it was foreseen that the capacity of the generating station at Merxem, of the Société d'Electricité de l'Escaut, would need to be supplemented. As the demands on the power stations at Alost, Malines, and Sweveghem of the Société Intercommunale Belge d'Electricité were also rapidly beginning to exceed the capacity, it was decided by the two concerns towards the end of 1927 to form a new undertaking, to be known as the Société Générale de Production d'Electricité Interescaut, for the purpose of erecting a large new steam-operated power station.

The new plant is located at Schelle, in the province of Antwerp, on the right bank of the River Scheldt, near its junction with its tributary, the Rupel, the site having been chosen for its convenience as regards the necessary condenser water and the regular supply of coal. Sufficient land was acquired to accommodate an eventual capacity of 630,000 kW. The buildings which have so far been erected have a length of 1,246 ft. and cover an area of about 269,000 sq. ft.

The boiler house

The initial plant consists of three 30,000-kW sets, but already there has been ordered from the Siemens-Schuckert works, Berlin, an 80,000-kVA set which will be one of the largest in the world to run at a speed of 3,000 r.p.m.

The boiler house, which is 354 ft. in length, 150 ft. in width, and 130 ft. in height, and is the first of three which are to be erected, at present houses six Babcock & Wilcox semi-marine type multi-tubular boilers capable of supplying 78 tons of steam per hour at a pressure of 610 lb. per sq. in. Later five additional boilers of similar type, but with a capacity of from 100 to 125 tons of steam per hour, are to be added.



The Interescaut station, Schelle

The boilers are pulverised-fuel fired on the "Lopulco" system, and they are provided with screened-tube combustion chambers. In addition to blowing and draught fans, the equipment of the boilers includes air preheaters, to facilitate the combustion of coal containing considerable ash and poor as regards volatile matter. The preheaters, superheaters, and blowers were supplied by Babcock & Wilcox, Ltd., London.

Coaling Arrangements

For the reception of the necessary coal supplies a quay 764 ft. in length has been built on the river bank at which vessels up to 5,000 tons may be moored. Provision has been made for a total of five electric cranes, two of which have so far been erected, each capable of handling 100 tons per hour. The grab hoppers deliver the fuel either into a bucket conveyor which transfers it to storage silos with a capacity of 25,000 tons, or direct by another conveyor to the boiler house. A short line of railway has also been laid to connect the station, where a 20-ton wagon-tipping plant has been installed, with the Belgian railway system to serve as an alternative route in case of any interruption of navigation. From the silos the coal is transferred by belt conveyors to secondary storage bins and thence to the pulverisers. The latter are of the Hardinge "boulet" electrically driven type, with a capacity of ten tons per hour, and equipped with a hot-air drying system.

The water feed to the boilers is effected by three centrifugal pumps built by G. & J. Weir, Ltd., Glasgow, and equipped with two driving systems (steam turbines and electric motors), each pump being capable of delivering approximately 61,600 gallons per hour at a pressure of 682 lb. per sq. in. The feed water is preliminarily heated to a temperature of 329 deg. F. by means of expanded steam taken from three different stages of the main turbines.

The Stores Lay-out (*continued from page 338*)

preferably raised above it on wood battens. Alternatively, the lighter coils can be mounted on large wooden pegs fixed in odd corners left over by the general plan. These are useful, too, for broken coils or short lengths which, if put into the ordinary bins, are apt to be overlaid and overlooked.

Similarly, flexible, if in unbroken coils or cartons, can be stored in bins; but broken coils need something more, if waste from tangling and soiling is to be avoided. Shallow trays with a solid drum in the centre, round which the flex can be coiled, solve the difficulty well; and, in the case of silk, they should be fitted with a cover to exclude dust. C.t.s. flex can be treated as cable.

Drawers are generally a nuisance in a store, but they may be used, with or without divisions, for certain small items in place of pigeon-holes, or for such articles as switch-plates. The lock-up cupboard mentioned will be found useful for the keeping of small stock which may be of high intrinsic value.

The proportion of the several types of receptacles and their arrangement will naturally depend upon circumstances, the size and plan of the space available, the character of the business, and the consequent character and quantity of stock carried. Whatever the arrangement, it should as far as possible follow some logical system: that is to say, goods of the same kind should be kept and classified together; e.g., bell and telephone material should be collected in a different part of the stores from lighting material, and conduit and cable should follow a sequence of sizes. On the other hand, any such system will clash, to a certain extent, with the general principle of keeping heavy material close to the ground, that most commonly used at the most convenient level, and fragile and rarely used stuff above; and in practice a compromise which is always necessary, will be arrived at by day-to-day experience.

Sub-stores for Large Contracts

On large contracts it may be necessary to organise small sub-stores. Usually the accommodation is limited and unsuitable, and the foreman, or his assistant responsible for handling the stock, lacks the routine training of the official storekeeper. On the other hand, the sub-store comprises nothing more than is required for the actual contract, in large quantities, perhaps, but of relatively few types; and clerical work is limited to booking out to that one contract, and to advices from and to the general store.

One cannot expect in such a sub-store the high organisation of headquarters, but it should be aimed at as an ideal. That is to say, the same principles of storing goods, of bin cards, of listing, and of booking in and out, should be followed as closely as circumstances permit. The responsible supervisor or, when possible, the head storekeeper, should, by frequent inspection and random checks, guard against its degeneration into the chaos too common in contractors' stores.

The Turbo-generators

The turbo-generator room consists of a building 206 ft. in length, 121 ft. in width, and 120 ft. high; it is equipped with two electrically operated overhead travelling cranes, one of 160 tons capacity and one of 10 tons. The plant so far installed consists of three sets of turbo-generators, each of 30,000 kW running at 3,000 r.p.m. Two of the sets consist of turbines constructed by Escher Wyss & Co., of Zurich, Switzerland, and generators built by the Société des Ateliers de Constructions Electriques de Charleroi (A.C.E.C.), while one set was supplied by Brown Boveri & Co., of Baden, Switzerland.

The turbines are of the multi-stage type taking steam at an initial pressure of 498 lb. per in. at a temperature of 797 deg. F. The alternators are directly coupled to the turbines and generate 50-cycle a.c. at 10,500 V. At the end of each set is a separate small alternator, providing power for various station requirements. The exciting current and the air necessary for cooling the windings of the main alternators are provided by a special set driven at will either by a.c. or d.c. motors.

An important item of the installation is the method of circulating the large quantity of cooling water required. This is effected by a pumping station, which has been erected on the river bank, drawing the necessary water from the Scheldt at all states of the tide. So far the station is equipped with four electrically operated vertical-shaft pumps, each capable of delivering 1,925,000 gallons per hour; one of the four pumps is kept as a standby. A further pump of approximately twice the above-mentioned capacity is to be installed in the near future.

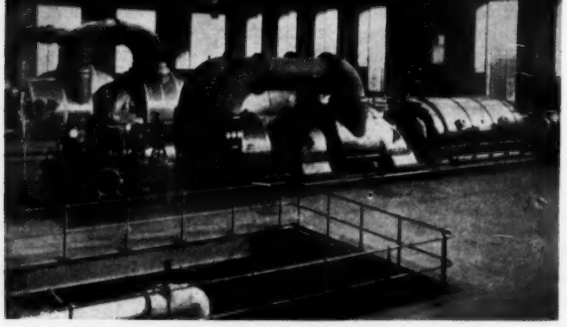
All the apparatus for the thermic control of the boilers, turbines, and condensers is located in a special separate room. For the lighting of the station, for which d.c. is employed, over 28 miles of cable and wire were used, there being altogether 1,300 lighting points, representing a total of 260 kW.

Transformers and Switchgear

The power produced by the generators passes direct to the transforming station, where it is stepped up to 70,000 V. The transformers are of "Asea" manufacture, and are each of 40,000-kVA capacity and of the oil-insulated type. The high-voltage bus-bars consist of hollow electrolytic copper tubes having outside and inside diameters of, respectively, 45 and 25 mm.

From the bus-bars the power passes through improved forms of switching and measuring devices to the outgoing transmission lines. At present the latter consist of two (3 by 105 sq. mm.) lines running towards the power station at Malines and two underground single-core cables (185 sq. mm. in section) feeding a 70,000/15,000-V transforming station at Schelle. The cut-out switches are of the suspended type and are operated electrically from the main control board in the power station.

The switch room is located near the machine hall, the generators and outgoing high-voltage lines being controlled from separate desks. The internal services are controlled from vertical panels on which are mounted the necessary measuring instruments, automatic voltage regulators, protective relays, and short-circuit pressure limiters. There are also instruments for registering the pressure and frequency and for controlling the running of the generators in parallel.

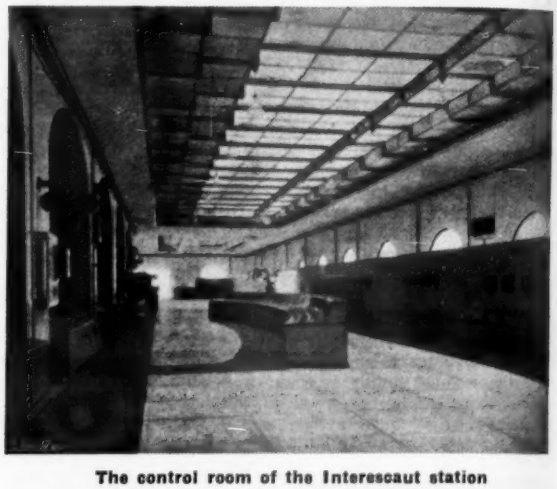


Turbo-generator room

For the station's internal requirements two 10,500/3,000-V transformers have been installed, their control and distribution gear being located in a special small building. Finally, for external station needs, including the cranes, a small 3.000/500-V transforming station has been provided, all the 500-V gear being of the armoured type. To provide against the failure of any of the essential services of the station, a battery house has been erected; this is equipped at present with 146 cells with a capacity of 9,000-A, and capable of delivering 4,500 A for one hour.

Interconnection Arrangements

The Schelle station is so linked up by high-voltage transmission lines that it can be run in parallel with the central stations at Alost, Malines, Sweveghem, Bressoux, and Liège, and with the Warche hydro-electric plant. Further high-voltage lines are also in course of erection, which will link up the plant with the generating stations at Merxem and Moll, and with the power plants at the collieries in the Limburg area. It is also proposed to connect Schelle with the power station at Langerbrugge, West Flanders, which is already linked with station at Zeebrugge as well as those in the Charleroi district.



The control room of the Interescaut station

Among the subsidiary buildings which have been provided at the station, in addition to the usual cloak rooms, may be mentioned employés' bath rooms, a small hospital and pharmacy, and an electrically operated chemical laboratory for conducting tests of coal, oil, water, refractory material, &c. With the object of rendering the home life of its employés as comfortable as possible, the Interescaut Co. is also engaged in the establishment of a garden city in the neighbourhood of the station. So far about twenty-six houses have been built, but the plans provide for a total of 130 various-sized houses, each having its own garden.

We are indebted to Mr. A. Wust, chief engineer of the Société d'Electricité de l'Escaut, for the accompanying illustrations of the new Schelle power station, which as it gradually reaches its full capacity is bound to play an important part in the industrial development of Northern Belgium.

Copper Oxide Rectifier Patent

A legal decision has recently been given in the United States Circuit Court of Appeals regarding the basic patent on the copper oxide rectifier, which covers the principle of alternating current rectification at the internal boundary between a copper plate and a layer of copper oxide formed directly on the plate. The invention is due to Dr. L. O. Grondahl, of the Union Switch & Signal Co., of Pennsylvania. This company and their licensees, the Westinghouse Electric and Manufacturing Co., Pittsburgh, were the plaintiffs in the action, the defendants being the Kodel Electrical Manufacturing Co. The General Electric Co., of Schenectady, U.S.A., also manufacture the rectifier under licence.

In the original action in the Lower Court it was held that certain vital claims of the Grondahl patent were valid and infringed by the defendants, and the plaintiffs were granted an injunction with an account of profits and damages. During the original action and in the Appeal Court a large number of prior publications cited against the novelty of the invention were considered at great length. While it was admitted that the rectification or detection of small alternating currents by devices involving point contact phenomena were well known prior to the date of the patent in question, none of these publications disclosed the broad idea of utilising a relatively large area at the internal boundary between a copper plate and a layer of cuprous oxide formed thereon for the rectification of alternating currents, this being the fundamental novelty of Dr. Grondahl's invention. The Appeal Court confirmed the finding of the lower court as regarded infringement by the defendants, and found that the claims in the patent covering the broad idea of rectification over a relatively wide area at the internal boundary between the copper and the copper oxide formed thereon were valid.

Oil Circuit-breaker Ratings. By S. Ferguson, M.I.E.E.

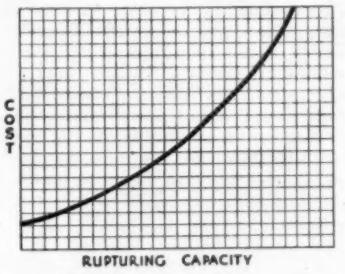
Technical and commercial considerations affecting their installation

THE continual increase in the capacity of generating plant, the grid inter-connections, and especially the large increase in the number of overhead transmission lines, with their consequent greater liability to faults, make it imperative that more consideration should be given to the design of circuit breakers and their capability of dealing with the maximum short-circuit powers at the points where they are installed. We have probably now reached a critical stage of development. Other countries have found that up to a certain point they had little or no trouble with oil breakers, but, after passing that stage, they have had a succession of failures.

Circuit breakers can be grouped into two categories: first, those which have undergone numerous rupturing tests and can be given a definite scientific rating; and, secondly, those which have never undergone such tests, the design of which is largely conjecture, and the rating estimated only. These two types will be referred to as A1 and C3 respectively.

Unknown Factors

The 1923 B.S. Specification No. 116 stated that breaking capacity ratings may have to be "estimated," and the majority of breakers supplied at that time came under this category. Although the specification has been revised, there is still a large number of breakers being installed with only "estimated" ratings. Many engineers are at present contemplating changing their breakers to meet the new conditions, and it is very desirable that they should not substitute one "unknown" for another "unknown."



Cost of breaker in relation to rupturing capacity

The rating of "plain-break" oil breakers raises a number of commercial, as well as technical issues, the consideration of which is overdue. In determining the rating to be assigned, the factory research engineers desire a liberal factor of safety over the worst conditions, regardless of the infrequency with which those conditions occur, whereas the sales staff press for the maximum rating within the B.S. Specification in view of extreme competition, especially from those makers using only "estimated" ratings.

If an appeal is made to supply engineers for guidance as to "factor of safety," diametrically opposed views are expressed. One section contends that it cannot afford to pay for the high rupturing capacities now required, and that the cost must be kept down to the absolute minimum. Another section contends that it must have the maximum security under the worst possible conditions imaginable.

Two similar breakers were tested to breakdown, in order to provide data for determining their rating; one had porcelain insulators, and the other bakelised paper insulators. The limit on the former was reached at 265,000 kVA, whereas the limit on the latter was 387,000 kVA. In each case the breaker cleared on the C.O. portion of the duty cycle and broke down on the O.C.O. portion; in the one case the porcelain broke above and below the top-plate, whilst in the other the bushing was blown out. The tank and top-plate, in each case, were not affected in any way. The performance expressed in B.E.S.A. duty cycles was as follows:—100,000 kVA and above, 28; 150,000 kVA and above, 20; 250,000 kVA and above, 11; and 350,000 kVA and above, 2.

The performance at 350,000 kVA, with bakelised insulators, might qualify the breaker for that rating according to the B.E.S.A. rules, but would the factor of safety be satisfactory to the supply engineer, as the rating is very near to the ultimate limit?

Test-circuit Characteristics

The B.E.S.A. rules, which must necessarily lag behind the progress of the art, do not take account of one important factor which research has recently disclosed, namely, the effect on the performance of breakers of the test-circuit characteristics. This important factor, which is referred to later, might make a difference in severity of the order of 2 to 1, the most severe circuit conditions attaching to the factory testing plant.

This means that the above breaker (subject to the weakest points not being those due to thermal or electromagnetic stresses) might be capable of rupturing double the powers referred to, if the test circuit consisted of a supply system with plenty of electrostatic capacity. If a manufacturer takes his test circuit from a supply system instead of a factory plant, he will probably, whilst complying with the B.S. Specification, be able appreciably to increase his ratings.

Having now indicated some of the difficulties in determining a scientific rating, the question arises as to how uniformity can be obtained. The supply industry is vitally concerned. If too high a factor of safety is allowed, the gear is too costly; if too low, there is serious risk to continuity of supply, life, and property. The Research Association has appreciated that scientific ratings can be determined only from actual test records. The writer believes this view is shared also by the Central Electricity Poard and the Home Office electrical inspectors, but apparently it is not fully appreciated by the supply industry, or the directors of manufacturing organisations; otherwise, the vigorous appeals made by Mr. Wedmore, the Director of the B.E.I.R.A., would have met with better response.

Scientific Rating

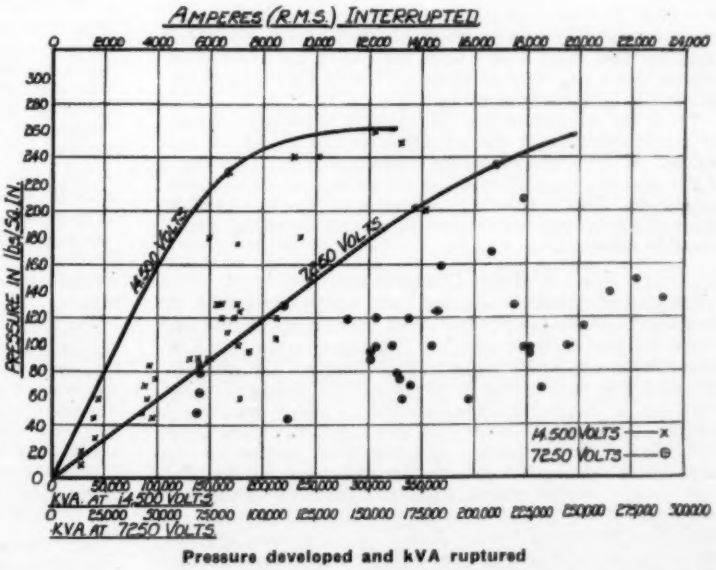
There are over 20 manufacturers of oil breakers in this country, and the number is increasing every year. Taking it for granted that the supply industry wishes to have scientifically rated breakers, one of two courses must be adopted for its own protection:—

(*a*) To put down a proving house for rupturing tests.

(*b*) To purchase no breakers except on satisfactory evidence of rupturing ability.

There are many advantages to the supply industry in putting down a proving house, in that an accurate comparison is possible with identical test-circuit conditions; this would enable the products of the numerous manufacturers to be certified. The question is, who is to put down the large capital sum involved. In Holland there is an association of power companies and municipal electrical undertakings which controls a testing station. Inquiries have been issued for the requisite plant to carry out rupturing tests on all breakers. This is a good example and worthy of emulation.

I believe that it would pay the supply industry handsomely to incur this expenditure. If the manufacturers made their contributions they would doubtless require as a first condition that the industry would purchase only certified products. Many manufacturers have made their own arrangements for research testing, but the difficulties mentioned above should bring home the desirability of the ratings being approved by an independent authority. Supply engineers purchase all their other electrical machinery on a scientific basis of output and efficiency; it is most unfortunate that they do not carry out this practice with oil breakers.



Pressure developed and kVA ruptured

The price paid for a C3 breaker may be only 60 per cent., but the rupturing capacity they get may be only 30 per cent. of the tested article; this puts scientific rating at a disadvantage. If the purchaser is not prepared to pay a margin of price over the cost of production, then research and development work must cease.

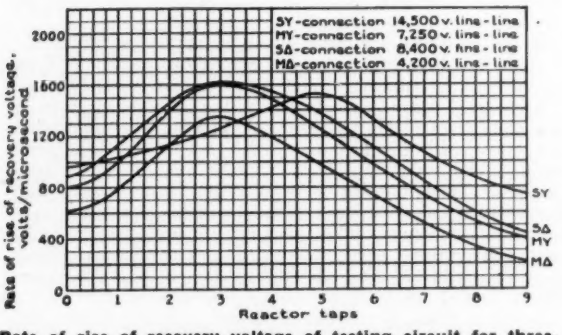
Expenditure on Testing

In order to give some idea of the cost of rupturing tests, it might be pointed out that the firm with which I am connected is at the present time in the middle of a six months' testing programme, the cost of which will represent 80 per cent. of the cost of production of the breakers made during that period. Fortunately such testing programmes need not be continuous, but, if they are only undertaken periodically, they may represent a charge on the production cost of the order of 20 per cent. The magnitude of the testing programme referred to will be appreciated when it is stated that the aggregate kVA ruptured up to date is about twice the short-circuit power that could be given by the whole of the electric generating plant in this country, using the B.E.S.A. duty cycle.

The routine hydraulic pressure testing of breaker structures involves further continuous expenditure of the order of 5 per cent. It is evident, therefore, that manufacturers of A1 breakers have to incur an expenditure of the order of 25 per cent. which may not be met by makers of C3 equipments. When tenders are under consideration it should be borne in mind that the rate of profit on this class of apparatus is less than 10 per cent. of the selling price for the most efficient manufacturer.

Estimated Values

The more experienced makers, when they first put their C3 breakers to the test, found many unsuspected weaknesses and in many cases had to de-rate them. There is no reason



Rate of rise of recovery voltage of testing circuit for three-phase tests, first phase to clear

to assume that the less experienced makers would be more fortunate, and it is my considered opinion, based on witness of rupturing tests, that a very large number of the breakers at present in service falls short of the estimated rupturing ability assigned to them when supplied.

It is a fair assumption that the value of switchgear affected by this question is in the neighbourhood of £2,500,000 per annum. If the actual rupturing capacity is only 80 per cent. of the assigned capacity, the loss to the industry is £500,000 per annum. This is more than sufficient to pay for a proving house plant, which would force all manufacturers to assign scientific ratings.

Unfair Competition

The present conditions of competition are grossly unfair, in that the C3 manufacturer can adopt any rating he chooses, whilst the manufacturer who has mortgaged future profits in determining a true rating has no such liberty. The competition should be on efficiency of design and manufacture, rather than on a comparison of "scientific" and "estimated" ratings. It is no answer to say that the "unknown quantity" has given satisfactory performance in service, as the most severe conditions may never have been encountered.

It must be remembered that this question involves not only continuity of supply, but also danger to life and property. It is a sign of the times that the Home Office inspectors are now taking exception to breakers too small for a particular situation on the supply system, but the risk is not removed if the rupturing capacity of the replacing breakers is unknown.

Specifications frequently call for a complete schedule of breaker data, but it is extremely difficult for engineers to assess values on this information as one can have: (*a*) too fast or too slow a speed of break; (*b*) too large or too small an air cushion; (*c*) too large or too small a head of oil; or (*d*) too large or too small a vent, &c.

The most economical values for the above can be obtained only by a long series of rupturing tests so as to produce breakers with well balanced characteristics with small dimensions and weights, but at the same time possessed of a liberal factor of safety. Even such an apparently insignificant point as the angle on the usual "V" type finger contact has been found to be of importance. There is such an enormous number of variables interdependent on one another that test data is the only satisfactory basis of comparison.

The User's Requirements

The following is a statement of the principal features to which the buyer directs his attention:—

(*a*) What maximum pressure would be developed in the tank when the breaker is rupturing powers within its rating?

(*b*) What factor of safety will the breaker structure give at such pressures?

(*c*) Will the breaker perform its function without throwing oil or emitting flame?

(*d*) Will it stand the thermal and electromagnetic effect imposed by the peak short-circuit current?

(*e*) How near is the breaker operating to the destruction limit at its assigned rating?

Unfortunately, satisfactory answers cannot be given to these questions on C3 breakers as they are only determinable by test. The Home Office requires pressure tests on boilers; why should it not require tests on breaker structures up to the maximum pressures which they can develop within their ratings? Many of these breakers have characteristics which experienced testers know quite well would give trouble due to such causes as:—arcing to the end of the stroke; developing too high pressures; failure of breaker structures; throwing oil and flame even with structure intact; and the slowing up, the stopping part way, or even the re-closing of the moving contact bar, &c.

Technical Considerations

The present view is that final arc extinction occurs when the rate of recovery and final value of dielectric strength exceed the rate of rise and final value of recovery voltage, respectively. The rate of rise of recovery voltage is, therefore, an important factor and may introduce a variation of 2:1, so that ultimately we may have to revert to the basis of current for expressing breaking capacity coupled with a specified minimum rate of rise of recovery voltage for each of the standard normal-voltage ratings.

Duration and length of arc drawn in oil are extremely variable, even when all external factors are under control and kept constant. As a consequence, the amount of gas and the pressure generated are erratic quantities, and a large number of rupturing tests is necessary to determine the maximum pressure likely to be developed on a particular breaker.

The figures obtained with one breaker will not hold good for another, as the maximum pressures are dependent not only on the powers ruptured but on design details. These pressures may be controlled to a large extent; the breaker to which the test figures given below relate has had over one thousand rupturing tests up to 900,000 kVA and the maximum pressures recorded within the ratings have not exceeded 300 lb. per sq. in.

Such figures were not obtainable on the old designs, which in some cases recorded more than double these pressures. The erratic value of the pressures and the large number of tests necessary to determine peak values are indicated in the curve of pressures and kVA ruptured on page 341. It is important to remember that vents on "non-oil throwing" breakers do not relieve the breaker structure of the maximum impulse pressure but merely allow the gases to escape after interruption.

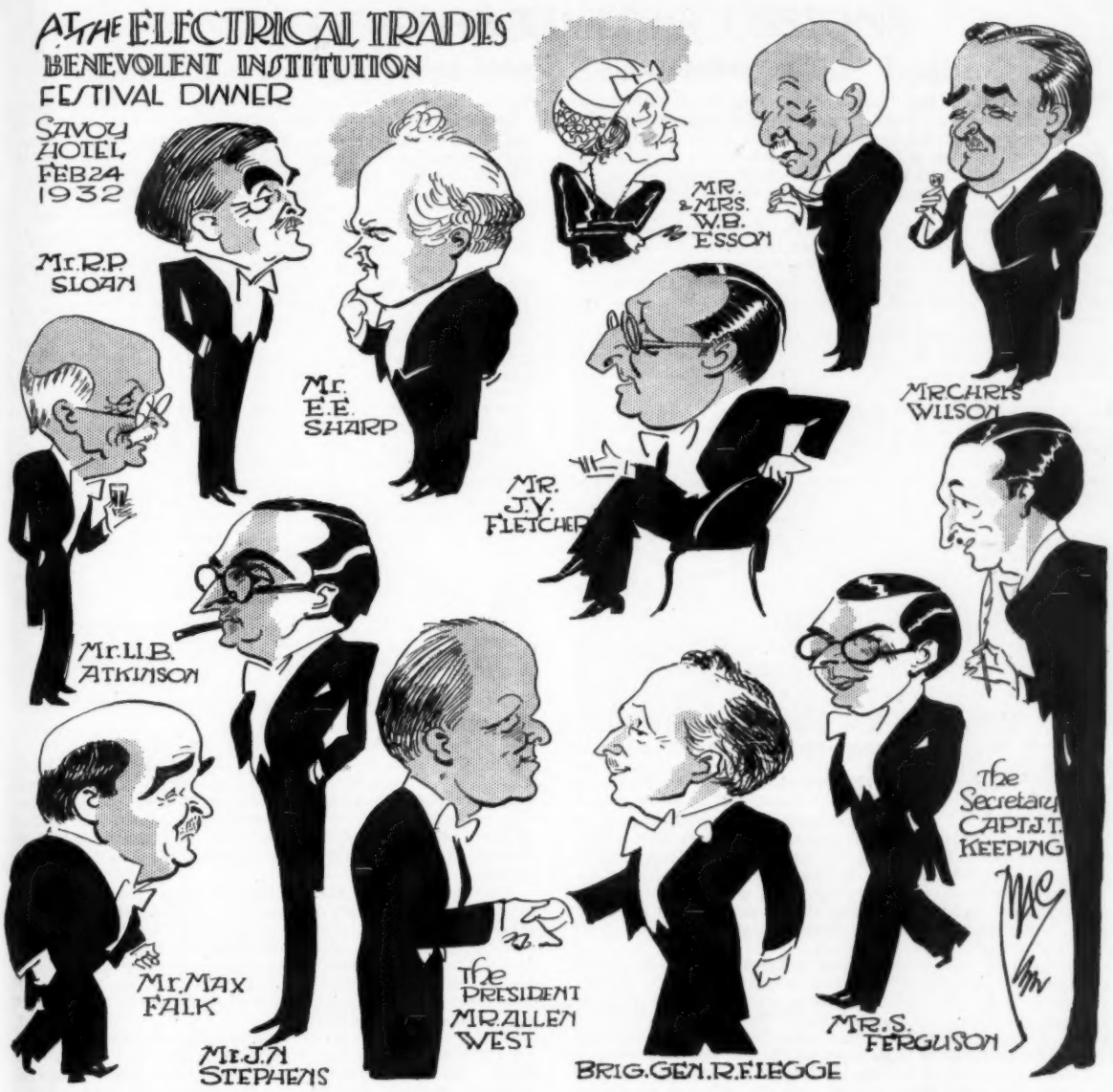
The tests were made on an alternator with a short-circuit capacity of over 1,000,000 kVA having rates of rise of recovery voltage as shown in the last figure. The neutral was insulated, the recovery voltage exceeded 90 per cent., and power factor was practically zero. The pressure recorder was of the electromagnetic type which registered instantaneous values at 1/1,000th of a second intervals.

Whilst the first problem is to ensure that the industry is getting the rupturing capacity it specifies, in the near future it will want to know how *efficiently* the breaker performs its function.

Lighting the Laundry

The following values of illumination are found to give good results for the various operations in the laundry. They are taken from "Electric Light in the Laundry," Booklet S, issued by the E.L.M.A. Lighting Service Bureau, which contains other information illustrating the truth of the maxim that "good lighting saves more than it costs."

Receiving and checking, 10 ft.-candles; Washing 8 ft.-candles; Calendering, 10 ft.-candles; Ironing and pressing, 12 ft.-candles; Sorting and checking, 10 ft.-candles; Despatch, 5 ft.-candles.



THE annual festival dinner of the Electrical Trades Benevolent Institution took place at the Savoy Hotel, London, on February 24th. The president, Mr. Allen West, and Mrs. West received the 128 members and guests who attended, some thirty fewer than last year's gathering. The result of the festival is, however, considered satisfactory considering its postponement on account of the General Election and the incidence of the British Industries Fair.

Apart from the loyal toast, two speeches only were delivered, both short and to the point.

Mr. Allen West reminded the company that the E.T.B.I. had now been in existence for twenty-five years, and the foresight of its founders had been fully justified by the needs of the present time. The industry was a large one, and it had by no means finished growing.

It was the duty of those engaged in it to see that the E.T.B.I. received its share from the industry, for its present income was nothing like large enough to be representative of the industry as it was to-day. The total income in 1931 was about the average, but the needs of the Institution were more than ever pressing just now, and he hoped that his appeal would go out beyond the dining-room.

Brig.-Gen. R. F. Legge, in proposing the president's health, remarked that the companies with which he was connected had not known enough about the E.T.B.I.'s good work. He promised that as they progressed so would their contribution to its funds grow.

What had their president done? His was a one-man business; he was a leading personality in the industry, extremely busy, and yet he had found time to accept the presidency and had started a small branch in Brighton. It was to be hoped that others who would follow him in the chair would do likewise, so that the Institution's good work might spread all over the country.

During his seven years in the electrical industry he had been connected with companies which served many rural areas, including North Wales. When visiting those districts he had found great electrical ignorance amongst the rural population. Whose fault was that? They needed educating electrically; there was no forceful publicity for the industry as a whole. There was no need to repeat what the gas people were doing.

If the electrical industry prospered, the need for benevolence would be reduced, but E.D.A. had to make bricks without straw; its financial support failed lamentably. Each section of the industry had its own association, but there was no co-operation between them, and without it they would achieve nothing.

He was not an advocate of new associations, but they seemed to require some new body, like the Commercial Association suggested by the ELECTRICAL REVIEW, by which all parties—the manufacturer, the supplier, and the contractor—would sit round one friendly board and discuss problems in which they were mutually interested. He was sure that such an association would not only benefit its members, but would also benefit the general public whom they were all out to serve.

The president then briefly acknowledged the toast, and announced the result of the festival collection, which represented a total of £3,499. Of this, £100 was contributed at the dinner, while Mr. Allen West's collection amounted to £1,966.

The remainder of the evening was devoted to dancing, and once again Capt. J. T. Keeping, the secretary, is to be complimented on the adequacy of the arrangements and the smoothness with which they were carried out.

About five hundred people were present at the second annual ball of the Tees-side Section of the E.T.B.I. held at Middlesbrough Town Hall last Saturday, and it is hoped that last year's contribution of £40 to the E.T.B.I. funds will be increased to £60. Among those present were the Mayor of Redcar (Mrs. I. Lonsdale), the Mayor and Mayoress of Middlesbrough (Alderman and Mrs. A. Marshall), and Alderman Stanley Sadler. There was an excellent cabaret show, and those responsible for the arrangements—Messrs. R. H. Scotson, G. D. W. Middleton, A. T. Griffith, R. N. Crawford, P. Graham, R. H. Huntley, A. D. Mackinnon, J. W. Morrish, J. A. O'Brian, A. Parkin, A. S. Richards, H. Sanderson, C. H. Stagg, S. Tillotson, H. Towers, W. Upton, and T. T. Will—are to be congratulated on their complete success.

The Fair

Successful results reported by exhibitors

THE success of the "heavy" section of the British Industries Fair at Castle Bromwich, Birmingham, is fully assured. At the beginning of this week there was a consensus of opinion in most departments of the Fair that the position, in respect of actual business done and the number of inquiries received, was satisfactory and distinctly encouraging for the future.

On Saturday a correspondent of the ELECTRICAL REVIEW, in company with an official of the Fair Management Committee, made an exhaustive tour of representative stands in the electrical group in order to ascertain the business experience of exhibitors and found that an optimistic tone characterised the whole of the trade.

Lt.-Com. Arthur E. Neal, R.N., Area Officer of the South Midland Section of the British Electrical Development Association, said: "I believe that the business results of the Fair this year will be in every way satisfactory. The position at the moment, in respect of orders and inquiries, is infinitely better than that at any previous Fair. This year there has been a very substantial increase in the number of foreign inquiries. These are very wide in their range, but they are principally in relation to domestic equipment and to thermal storage plants."

A large firm of manufacturers of electric cooking stoves and street lighting equipment stated that they were more than satisfied with the amount of business they have done. The manager estimated that at mid-day on Saturday last £13,000 worth of orders had been placed with his company. The bulk of this business was for electric cookers, but some good orders had been taken for traffic control apparatus and street lighting accessories.

Orders for Heavy Equipment

In the metallurgical industries the use of the electric furnace for all kinds of heat treatment processes is rapidly growing. One firm stated that they had sold already at the Fair a larger number of such furnaces than they did during the whole of the 1931 Fair.

The representative of an important firm of manufacturers of electric welding equipment said that they had every reason to be optimistic. "They had done excellent business, particularly in this country, and had received some very nice orders from Denmark. The number of inquiries from that country and other Continental countries was estimated at about forty." The same story was told by makers of small machine tools and portable electric drills who had received orders from all parts of the country and from Czecho-Slovakia, Sweden, Norway and India.

The head of one of the largest firms of heavy switchgear equipment in this country said that they had had more visitors and more technical experts on their stand this year than at any previous Fair, and the number of foreigners had been at least four times greater than last year. Those in this business were satisfied that the trade tone was better and improving.

A firm of makers of electric lamps and torches said that 250 inquiries had come from abroad, and a number of purchases had been made by representatives from Germany for electric cycle lamps and from Holland, Denmark, Scandinavia and New Zealand for electric torches and lamps..

Business in electric clocks and motor sirens was also satisfactory, it was stated, and a manufacturer of a specialised form of electrical thermal storage stated that he had been asked to supply Danish and Swedish engineers with plans for the central heating of offices, schools and private houses.

The Prince's Visit

The Electrical Section received the special attention of the Prince of Wales when he visited the Birmingham Fair on Thursday last week. His Royal Highness was met by Mr. T. R. Martin, chairman of the Electrical Advisory Committee, who acted as guide.

The party halted for some time at the stand of Messrs. Crompton Parkinson, Ltd., where the Prince showed great interest in the company's new tong test ammeter, which has been made for the purpose of measuring currents in conductors without breaking the circuit by surrounding the conductor with a split electro-magnet.

Lord Barnby received the Prince at the stand of the Central Electricity Board, in the absence of the chairman of the Board (Sir Andrew Duncan), who is abroad. Mr. S. T. Allen, engineer for Central England, and Mr. J. T. H. Legge, managing director of the Shropshire, Worcestershire and Staffordshire Electric Power Co., were presented to His Royal Highness. A considerable time was spent at this stand in the examination of an illuminated map showing the Board's transmission lines and sub-stations.

Special interest was shown by the Prince in the stand of Messrs. A. Reyrolle & Co., where he saw a photograph of himself opening the British Empire Trade Exhibition at Buenos Aires last year. The actual switch with which this was done is one of the exhibits on the stand, and the Prince again operated the switch on this occasion for the purpose of lighting up a power station control board.

A model factory in operation, arranged by the General Electric Company attracted the attention of the Prince, who was shown over the stand by Dr. A. H. Railing. The working process comprised the making of electric lamps, and the various operations which were demonstrated were wire making and coiling, bulb manufacture, evacuation of air, filling with gas, and capping and testing. The stand was illuminated with special electrical equipment, as used in the British film studios.

At the stand of the British Electrical Development Association the Prince was received by Mr. G. H. Lake, chairman of the South Midland E.D.A. Area Committee, and Lieut.-Commander A. E. Neal, the area officer.

Mr. Felton received the Prince at the stand of the Revo Electric Co., Ltd., and showed him some lanterns similar to those which are being employed for lighting streets in the city of Westminster. The company's cooking apparatus and quick boiling hotplates were also inspected. The party then proceeded to the stand of the Birmingham Electric Supply Department where Sir Percival Bower, the chairman of the Electric Supply Committee, was presented to the Prince. It was pointed out that a number of firms had exhibits on the Corporation stand to demonstrate to the manufacturing world and to the public generally the important part which electricity could play in reducing costs by doing away with overhead shafting, each machine having its own motor and being an independent unit within the factory.

Much interest was also shown in a thermal storage system, and at the stand of Messrs. Wm. McGeoch & Co., Ltd., the Prince was told the firm was started almost exactly a hundred years ago and congratulated them on the fact that the firm had been controlled by one family during the whole of its existence.

Mr. E. J. Jennings (secretary and commercial manager of the Birmingham Corporation Electricity Department), Mr. H. H. Berry (vice-chairman of the Electrical Advisory Committee), and Mr. H. Meighan (president of the Electrical Contractors' Association of Scotland) were among those who were presented.

Some Electrical Visitors

The delegation to Castle Bromwich on February 26th included the Association of Mining Electrical Engineers, who lunched with representatives of the Institute of Quarrying. The toast of "The Visitors" was submitted by Mr. Holland Harper (vice-chairman of the Board of Management of the Fair), and Major Ivor David (president of the A.M.E.E.) briefly replied.

The visitors to the Section last Saturday included the Electrical Power Engineers' Association and students of the South Midland Centre of the Institution of Electrical Engineers.

Mr. Peter Bennett (vice-president of the Birmingham Chamber of Commerce) presiding at a luncheon, cordially welcomed the E.P.E.A., and also Mr. Ll. B. Atkinson, the "father" of the Cable Makers' Association, and chairman of the Electrical Development Association.

Mr. N. B. Rosher (chairman, South Midland Centre, I.E.E.), proposed the toast "The Electrical Engineers," and said that when the grid system functioned fully there would be a notable increase in all the ramifications of the industry. There was a vast field for exploitation which, as yet, was hardly tapped—that with regard to domestic appliances. If only one railway system would thoroughly electrify the lines the result would be, he was sure, that the other railway companies would follow suit.

Mr. J. H. Taylor (Electrical Power Engineers' Association), replying to the toast, said the value of the educational side of their work could not be exaggerated; he believed the correspondence tuition scheme would be of real value to those students who were situated a considerable distance from the big technical colleges.

Points of Interest

Our representative was informed that the induced current boiling unit developed by Mr. N. W. Gilbert, of Berkeley & Young, Ltd. (illustrated on p. 349), has been inspected by many supply engineers. Their interest in this new device was indicated by the fact that practically all of them ordered samples for trial purposes. It is Mr. Gilbert's intention to concentrate in the first place on commercial applications.

From its stand the Lancashire Electric Power Co. has distributed copies of an attractive booklet entitled "Factories—Usines—Fabriken." As this indicates, it is a tri-lingual production drawing attention to the advantages possessed by factory sites in the company's area of supply, with particular reference to the facilities provided by the company itself.

On Wednesday last the Fair was officially visited by members of the I.E.E., the I.M.E.A., the E.D.A., the E.W.F., the B.E.A.M.A., and other electrical associations, and in the evening a dinner organised by E.D.A. was held in Birmingham.

The "Elequamatic" system of thermal storage mentioned in our last issue (p. 306) is a production of Messrs. Couzens and Akers, Ltd.

Upon the stand of Berry's Electric (1928), Ltd., Messrs. Nalder Bros. and Thompson, Ltd., have a representative display of their electrical instruments.

The Olympia exhibit of Messrs. Rotherham, clock makers, includes a number of examples of Messrs. Everett Edgcumbe and Co.'s "Synclocks" in a variety of styles.

MEETINGS AND DISCUSSIONS

Current Topics and Opinions Expressed at the Institutions

The Influence of the North-east Coast

THE inaugural dinner of the NORTH-EASTERN SUPPLY COMPANIES OLD EMPLOYÉS' ASSOCIATION was held on February 25th at the Waldorf Hotel, London, W.C.2. Speeches were made by Mr. R. P. Sloan (chairman, N.E.S. Co.), Col. W. McLellan (Messrs. Merz and McLellan), Mr. W. B. Woodhouse (engineer and general manager, Y.E.P. Co.), and Mr. H. E. Blackiston (borough electrical engineer, Ipswich), to whom the idea of forming the Association is due.

The speeches were mainly of an informal character and reminiscent of the earliest days of the group of power companies, which in the opening of the century and before the passing of the first Power Acts, contained the germ of the present undertaking to whose network, covering an area of 4,700 sq. miles, is connected the largest industrial, domestic, and rural load of any European supply system.

WHERE AMERICA LEARNED

This was the origin of the grid system in Great Britain, where scope was given to manufacturers to gain valuable experience in large-scale operations. Many features of power supply, such as the system of control engineers, was originated in the area of the companies; they were later adopted in the United States and then sent back to this country as a particularly good example of American organisation.

The heavy industries on Tyne, Tees, and Wear are in a depressed condition, but every opportunity is being taken to develop the use of electricity in other fields. The domestic load is growing rapidly, and recently added territory of a more specifically rural character is being actively developed along the lines evolved by the companies since 1906 (the technical basis of this scheme was given in the ELECTRICAL REVIEW of September 18th, 1931).

The speakers expressed the conviction that all ex-members of the staffs of the companies (plural in name only and shortly to be formally merged under a more suitable title) would welcome the formation of the Association as a link with the strenuous school in which they had gained the experience that had led to so many of them achieving positions of eminence all over the world. Mr. Sloan showed himself possessed of a hitherto unsuspected talent; he recited an original poem in which the names of many of those present were utilised in some form or other.

OBJECTS OF THE ASSOCIATION

A committee composed of Messrs. W. G. Bass, H. E. Blackiston, G. N. Wright, and Dr. E. Bowden was appointed with instructions: (1) to arrange for the holding of an annual dinner; (2) to prepare a register of those eligible for membership of the "Nescoe"; and (3) to enrol members at a nominal subscription of 2s. 6d. per annum.

The arrangements for this dinner were necessarily somewhat hastily made, and the whereabouts of some of those who might have been present could not be ascertained in time. These and all others interested should communicate as early as possible with the hon. secretary, Mr. W. A. Bass, 506, Bush House, Aldwych, W.C.2.

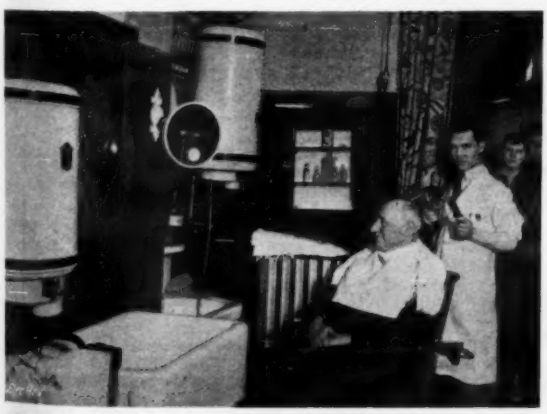
The gathering included in addition to those mentioned above:—Messrs. R. Ayton, E. Barrs, E. Benham, L. E. Buckell, W. A. Christianson, T. C. Christianson, W. Dixon, N. H. Firmin, J. Hacking, H. Hobson, P. V. Hunter, A. S. McColgan, I. S. Mackenzie, R. R. Martindale, G. L. Porter, D. J. E. Richards, H. S. Ripley, J. R. Sams, A. C. Smith, W. Wilde, and E. R. Wilkinson.

The street-lighting and traffic control exhibits at the B.I.F., Birmingham, including "Revo" apparatus, lamp standards by Concrete Utilities, Ltd., and some G.E.C. fittings

How the N.P.L. Tests Radio Receivers

IMPROVEMENTS in the technique of radio receiver testing developed at the National Physical Laboratory are described in the paper which Mr. H. A. Thomas read before the Wireless Section of the INSTITUTION OF ELECTRICAL ENGINEERS on March 2nd.

The apparatus used has been modernised, modified, and partly rebuilt since the author's 1930 paper. It is capable of measuring a modulated radio-frequency voltage of from 1 microvolt to 1 volt at any frequency within the range 10 to 50,000 kilocycles per second. The accuracy of the voltage measurement is chiefly dependent upon that of the current measurement, and in the absence of any simple alternative method a non-contact thermo-junction is used at present. Within the limits imposed by the use of this instrument the accuracy is of the order of 1 per cent., which is quite adequate for radio-receiver testing.



Mr. R. A. Chattock "takes the chair" for a shampoo at Berry's stand at Birmingham

The modulation frequency may have any value from 20 to 10,000 cycles per second, the exact figure being set by beating with a standard tuning-fork, while the accuracy of the measurement of modulation depth is within 2 per cent. over the whole range from 0 to 100 per cent.

SPECIFYING PERFORMANCE

An attempt is made to draw up a schedule of tests by means of which the relative performance of different broadcast receivers may be assessed.

Hitherto, it has been the practice of manufacturers and testing laboratories to express the performance of a receiver by a number of graphical results, but it is extremely difficult to use such results for any direct comparison of the relative merits of different receivers owing to the varying nature of the experimental conditions and to the impossibility of determining the performance under a set of conditions differing from those used in the particular test.

These facts point to the need for some standard of test methods and performance, so that both manufacturers and purchasers of receiving apparatus may have a simple means of assessing the merits of particular receivers. The essential properties of a receiver may be classified as (*a*) sensitivity, (*b*) selectivity, and (*c*) audio-frequency response and purity factor. To group these three together and give an overall performance figure may appear to be a dangerous procedure, but an attempt has been made to do so, and whatever may be the disadvantages of such a course it cannot be denied that an overall figure of merit is of great value in so far as it introduces a comparative method of assessing performance.

The difficulty of so doing arises from the fact that the test specification must be such as to assess fairly the properties of the whole receiver and also give due weight to each individual property.

CLASSIFICATION OF RECEIVERS

It would be better to substitute for the sensitivity test a type classification, and to determine the properties of the receiver within the limits so imposed. This method possesses the advantage of eliminating a mass of irrelevant tests.

Any receiver submitted for test should be classified as suitable for one or more of the service areas defined in the paper and the test signal applied to it would correspond to the minimum field strength of that area. It is probable that a receiver may be suitable for more than one service area, in which case separate tests should be made at the inputs corres-

ponding to the various field strengths. The input would in all cases be applied to the receiver through a standard dummy aerial system.

The output power should be classified in a similar manner according to the type of output circuit adopted, and it would be measured in the optimum anode-circuit load resistance specified by the valve manufacturer as suitable for the valve used. The output resistance would in all cases be adjusted to this optimum value and the receiver would be tested with the maximum rated output.

The normal output level would in practice be very much less than this maximum, but since the receiver must be capable of handling the maximum output on transient high modulation percentages, it is better to test it at the maximum rated output.

SPECIFICATION EXPLAINED

According to this proposed specification, therefore, a "B3" receiver is one that will give a medium output of 500 to 1,000 milliwatts when a field strength of 5 millivolts per metre is applied to the standard aerial. In such a case, a fixed input of 20 millivolts would be applied to the dummy aerial, since its effective height is taken as 4 m, and the receiver would be adjusted to give the maximum rated output with a modulation frequency and percentage of 400 and 40 respectively. This receiver adjustment would remain constant for all further tests at that particular radio frequency. The procedure would be repeated for any other test frequency.

Following this sensitivity determination graphical methods of assessing selectivity and audio-frequency response (the purity factor) are described, the overall performance being the product of the three separate characteristics expressed as a percentage. This method of classification prevents high figures from being obtained by the excessive use of retro-action, and at the same time ensures that a poorly-selective receiver is not awarded a high figure of performance. The overall figure acts as a useful general guide to the performance, but it should only be given in conjunction with the three separate figures from which it is built up.

MINIMUM NOT FIXED

It may be argued that the author's test curves do not represent modern practice. While it is true that they do not represent a modern band-pass receiver with linear rectification, they are typical of many commercial receivers without band-pass tuning.

One advantage of the proposed method of specification is that it does not fix a definite minimum performance for each of the three properties. To obtain such a minimum figure it is necessary to make a large number of tests on various classes of receivers, and it is exceedingly difficult to say what minimum requirements are essential for satisfactory operation. The author feels that it would be better to adopt some such classification as the above, and then, as information was obtained for different receivers, certain values would be found by experience to be applicable to the limiting performance.

As the general standard of design improved, these values would rise automatically and act as a strong stimulus to further improvement. Ultimately, a minimum value for each separate test, together with a minimum value for the overall figure, could be adopted as a satisfactory criterion of the efficient behaviour of a receiver.

The Status of British Engineers

Replying to the toast of "Engineering and the Empire," which had been proposed by Mr. D. Balfour, O.B.E., at the annual dinner of the ASSOCIATION OF CONSULTING ENGINEERS, held at St. Stephen's Club on February 26th, Sir Cyril Kirkpatrick (president, Inst.C.E.) referred to the grid scheme as something that would revolutionise Great Britain and provide an immense amount of work. Wireless telephony more than anything else would be a factor in uniting the Empire.

Sir Edward Crowe, K.C.M.G. (Comptroller-General, D.O.T.), also responding, described the British Industries Fair as a great demonstration of what this country could do to "keep its tail up." The number of overseas visitors in the first few days was two and a half times that of previous years; they came chiefly from Denmark and Switzerland. British engineers were collectively too modest in "telling the world."

The toast of "Bench and Bar" was proposed by Mr. C. L. Howard Humphreys and responded to by the Hon. Mr. Justice McCardie and Col. H. F. Bidder, D.S.O. Mr. Justice McCardie said that while engineers were transforming the face of the country with the grid scheme and other developments, it was impossible for the principles and applications of the law to stand still.

"The Association of Consulting Engineers" was proposed by Mr. R. W. Hughman, who suggested that a fog screen of etiquette prevented full credit being given to British engineering. In reply Mr. S. C. Lewis (chairman, A.C.E.) said that while deprecating personal advertisement, engineers as a whole might well obtain more publicity for their profession. In order to be accepted by the public, membership of one of the three great Institutions was essential.

Church Lighting Problems

AT the last meeting of the ILLUMINATING ENGINEERING SOCIETY several short papers were submitted dealing with the subject of illumination in churches and cathedrals.

Mr. H. C. Wheat's paper was introductory. He mentioned the numerous individual views which have to be reconciled, each denomination having its own particular idiosyncrasies.

Mr. H. Robertson showed how impossible it is to generalise in church lighting.

A very interesting scheme has been carried out at Aix-la-Chapelle, in the Church of Our Saviour. Here the nave lighting is by means of long cords from the lofty flat nave ceiling, on to which, at intervals, are clipped naked tubular lamps. These long delicate streamers offer not only illumination, but a series of delicate points of light. A few floor standards, lighting upwards, complete the illumination.

The principal desideratum, in his opinion, is the incorporation of the lighting effects in the design and construction of the church form. This has not been often seriously attempted, partly because of the fear of startling conservative opinion, and largely because of the dearth of new work.

Students and younger members of the architectural profession are greatly interested in lighting, and the next few years will probably witness a far greater display of imagination and collaboration with illuminating engineers.

Mr. R. O. Ackerley dealt with the application of concealed lighting, and with the aid of lantern slides of typical installations he maintained that this was the best form of illumination so far devised for churches.

This method was specified for the Church of Christ the King, Cork, on account of the unique architecture of this edifice. It is a concrete building nearly an ellipse in outline, the curved portions being stepped to allow every person in the church to have an uninterrupted view of the altar. The lighting installation was described in Mr. E. Stroud's paper.

Everyday Uses of Electricity

THE eighth Faraday Lecture arranged by the Council of the INSTITUTION OF ELECTRICAL ENGINEERS has been delivered to large audiences at Manchester and at the University of Liverpool by Prof. J. K. Catterson-Smith. The lecture was opened by the exhibition of lantern slides, from the late Prof. S. P. Thompson's collection, referring to some of Michael Faraday's work, and the lecturer drew attention to the evolution of power generation and distribution and pointed out that we had now reached a stage of intensive everyday use of electricity. He then demonstrated the working and technique of a modern type of epidiascope, which he stated was the only one of its pattern yet in this country, and suggested the desirability of its everyday use in schools and colleges.

LIGHT MEASUREMENT

The importance of properly arranging lighting in the home and elsewhere was remarked upon and the use of several instruments commonly employed for the measurement of light was demonstrated. The lecturer showed the British Standard candle upon the light of which modern lighting units are based and then proceeded to demonstrate the working of a portable sphere-photometer, which he had constructed, for the purpose of making it a simple matter to measure the total flux of light emitted from a lamp in ordinary use anywhere.

This photometer was built up in the form of a collapsible sphere about thirty inches in diameter and was provided with an opening for the insertion of the lamp to be tested. The inner surface of the globe, being a pure white surface, was illuminated with a uniform intensity, and the latter quantity was measured by means of a selenium cell, connected to a 30-V dry battery, and a micro-ammeter placed in the epidiascope in order that an image of its pointer might be thrown, with a magnification of about 18 times linear, upon the screen so as to be seen easily by the audience. The photometer was calibrated by means of a standardised lamp of about 40 mean spherical candle-power lent by Messrs. Everett, Edgcumbe & Co., Ltd.

PRINCIPLES OF GENERATION

In order to explain in a most simple manner the working principles of d.c. and a.c. machines, and their associated circuits, the lecturer had devised a series of coloured cardboard moving diagrams which were projected, by means of the epidiascope, on to the screen so that their movements and working could be seen by the audience.

In this way he demonstrated the working of a dynamo and an alternator and the phase relations of current and voltage in the case of a lagging, low power-factor, load. The action of the voltage in causing a dielectric flux in a condenser was also shown, and finally the relative voltage and current magnitudes and phase relations of a three-phase machine were depicted.

The behaviour of a fusible cut-out was shown very well by means of a set-up comprising a miniature "Cirscale" voltmeter and ammeter connected to an ordinary house pattern fuse-holder, arranged with a rheostat so that the current could

be increased until the fuse, the image of which was on the screen, blew and the current was cut off. The indicating instruments used were lent by the Record Electrical Instrument Co.

The importance of correctly connecting small a.c. apparatus to the supply circuit was plainly shown by the apparatus.

SOME HEATING EXHIBITS

Turning to the everyday uses of electricity for heating purposes the lecturer demonstrated the effects of electric currents in various kinds of resistors and in particular exhibited non-metallic rod forms made of a silicon-carbide known as "Silit." He then exhibited the latest metal resistor known as "Kanthal," which is an alloy containing iron, aluminium, cobalt, &c., and capable of withstanding very high temperatures without injury. The spiral wire heaters shown were mounted on specially made silliminate rods and were found to be suitable for temperatures of from 1,350 to 1,400 deg. C., a marked advance upon other forms of heater units.

An experimental kettle was exhibited which was intended as a contribution towards the solution of the domestic problem from the electrical engineer's point of view; this kettle was an ordinary enamelled iron kitchen kettle of four pints capacity and was provided with a fired-on platinum film heater, on its base, designed for a working temperature very little in excess of that of the boiling water inside the kettle. The lecturer remarked that it should be possible to develop a kettle of this design and make it suitable for ordinary hard usage in the kitchen.

A very special household radiator was then shown at work; this was of the rod-heater variety, but differed from those usually manufactured in that its body consisted of a single pressing of refractory material of shell form suitably decorated for drawing-room use.

CLOCKS AND PUMPS

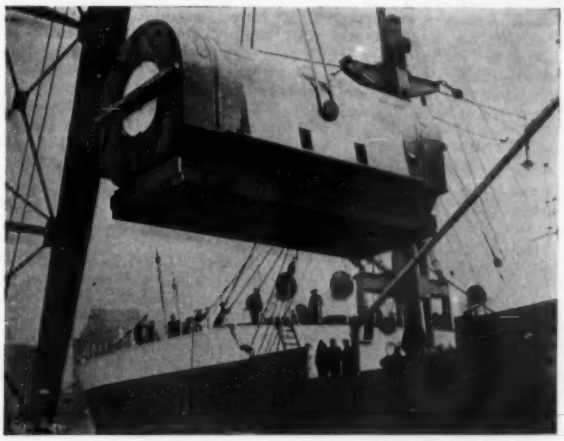
The behaviour of the synchronous clock was demonstrated by means of a model of its interior mechanism placed in the epidiascope and a clock at work was shown on the lecture table, these being lent by Messrs. Ferranti, Ltd.

The lecturer then referred to the probable value of extending the use of electric toys so as to familiarise children with the advantages of electricity and accustom them to the proper handling and care of electrical apparatus.

In conclusion some small electric pumps were shown; one lent by Messrs. Griffin and Tatlock was a small air-pump suitable for laboratory purposes. It consisted of an electric heater applied to a glass tube containing a column of air and connected to a "U" tube filled with mercury. On the principle of the hot-air engine the expansion and contraction of the enclosed air maintained the mercury in oscillation and thus formed a kind of Humphrey pump delivering air through valves on the side remote from the heater.

The other pump shown was connected to a 60-W motor supplied from the mains, and arranged to draw water from a fountain receptacle and return it at sufficient pressure to throw a very effective fountain and support a celluloid ball in the approved manner. The fountain was artistically decorated with flowers and proved a popular exhibit. The motor-pump for this was lent by Messrs. Whitney.

Mr. R. Catterson-Smith lent some of the exhibits in connection with the heating experiments and Miss Ryland the radiator. The lecture will be delivered at various other local centres of the I.E.E. during the remainder of the current session.



A 50-ton consignment of Metropolitan-Vickers electrical machinery being loaded at Birkenhead for shipment to South Africa

Power Station Fumes

AT a meeting of the London Local Technical Group of the ELECTRICAL POWER ENGINEERS' ASSOCIATION on February 23rd, Mr. J. W. Gibson dealt with the emission of dust and fumes from power station chimneys. He considered briefly centrifugal collectors, electrical precipitation, gas washing, &c., and with the aid of a series of lantern slides showed what dust looks like under a microscope.

In the subsequent discussion Mr. S. G. Nodes, speaking of fan erosion, stated that experiments were being carried out at the moment with the "Nordac" system of applying rubber to iron; by this process the rubber could be sprayed on or could be applied in the form of a self-curing rubber. The samples he had seen seemed to be very promising, and the process was also likely to come into use for lining pipes.

This electrical plate machine will shortly be put up for auction at Messrs. Sotheby's. It was made by E. G. Wood, who was in close touch with Faraday, and is said to have been constructed to Faraday's special order in 1830

The rotary filter with gas washing would not deal with the very light dust. Experiments with sand filters, either with upward or downward filtration, had been very successful.

Mr. E. F. Hall said that the views of local authorities varied very much on this point. In a plant with which he was connected they were suffering very much from what was called "fume," a very fine material which under certain conditions settled in the vicinity of the power station. Was water washing successful with powdered-fuel plant?

STOKER v. P.F. INSTALLATIONS

The author, referring to the comparison between stoker-fired and powdered-fuel installations, said that the average of some 15 stoker-fired installations showed the dust in the waste gases to be below 1 per cent. of the total fuel fired, whereas in the case of a powdered fuel station, using a fuel containing 12½ per cent. of ash, the dust collected was 13.4 per cent. of the total fuel fired, or more than the ash content. That was due to the fact that the plant was working with 12½ per cent. CO_2 and there was a fair amount of unburned carbon in the dust.

Mr. W. Wilde said he had found great difficulty in finding a lasting filter material; he had used a pure wool material, but even that only stood up for five or six hours. As to erosion, there was a need for some material which was not so affected as steel. Even wood was often more durable than steel.

Mr. J. Fleming said his experience had been that really soft steels stood up better than three per cent. nickel steel. The only difficulty was that where it was necessary to use high tip speeds on the fans this soft steel was not suitable.

Mr. R. Pendennis Wallis suggested that an important consideration was the tendency for the washing apparatus to cool the gases. If these were cooled below a certain temperature they did not diffuse by the normal methods into the atmosphere and therefore something had to be done to boost them up.

Mr. E. H. Lowden, chairman, did not see any necessity for dust-extraction plant on stoker plant because it should be worked so that grit was not discharged. Dust extraction might be necessary with pulverised fuel, but then he saw no need for pulverised-fuel as compared with efficient stoker plant! He was convinced that it was possible to eliminate grit altogether. The cause was the high velocity of the gases and if it was possible, as he believed it was, to get high power out of boilers without high velocity, then there would be no need for grit catchers.

Ventilating Large Generators

In a paper read before the JUNIOR INSTITUTION OF ENGINEERS recently, Mr. D. MacFarlane emphasised the necessity of using really clean air for ventilating and cooling modern large generators. Due to improvements in materials and methods of ventilation, machines with an efficiency of 98 per cent. could now be built. A modern 100,000-kW unit would require only 400 kW for ventilation, instead of the 1,500 kW needed with the earlier machines. Air in a closed circuit was the simplest and safest method of cooling. The use of brine cooling during peak loads would increase the rating from 25 per cent. above normal to 75 per cent.

Parliamentary Notes

BY OUR SPECIAL REPORTER

The Central Electricity Board

On February 24th Major-General Sir A. Knox asked the Minister of Transport whether the operations of the Central Electricity Board had so far resulted in supplying electricity to the consumer at a cheaper rate, and what the average saving had been.

Mr. Pybus said that Sir A. Knox would appreciate that the Central Board could only supply electricity in bulk to authorised undertakers, and not direct to consumers. He understood, however, that the Board was giving supplies under temporary arrangements in certain places, and that in all cases these supplies were given at a cheaper rate than that at which the undertakers could have generated for themselves.

Sir A. Knox inquired what was the total number of electrical consulting engineers whose services were retained by the Central Board; what was the total amount of their retaining fees; and what were their functions.

Mr. Pybus said that the Board, as stated in its annual reports, had retained the services of three firms of consulting engineers to deal with technical questions in connection with the design and lay-out of the grid and to supervise its construction. He had no information as to the amount of their retaining fees.

In reply to another question by Sir A. Knox, Mr. Pybus said he was informed by the Board that stock amounting to £26,000,000 had so far been issued and that the construction of the grid and the standardisation of frequency would, so far as could be foreseen, be completed for less than £50,000,000.

Railway Electrification

On February 24th Mr. Hutchison asked the Minister of Transport whether he would recommend Traffic Commissioners to give greater weight to the objections of railway companies to the granting of coach licences, when such objections were made on the ground that adequate alternative services were available by electrified lines, than to objections made in respect of non-electrified lines; and, if not, whether he would take an early opportunity of announcing his policy in this connection with a view to accelerating the electrification of the suburban lines.

Mr. Pybus said he had no doubt that where there were alternative facilities in the form of electrified railway services, the railway companies brought this fact to the notice of the Commissioners and that the Commissioners were in a position to give it such weight as they thought proper. He did not think that in these circumstances any action on his part was called for at present.

Import Duties Bill

During the final stages of the Import Duties Bill in the House of Commons, a number of alterations were made in the First Schedule (or "free list") which sets forth those articles which are to be exempt from the 10 per cent. *ad valorem* duty.

Mr. Chamberlain said that two kinds of ore were mentioned in the Bill as it stood, viz., iron and tin. Representations had been made to the Government that it was desirable that other kinds of ore should be included, and it was now thought better to take tin and iron ore out of the schedule and put in metallic ores of all kinds, and to include with them other things, including concentrates, sweepings, and residues.

The Government had also decided to include in the free list raw copper in its various forms, as well as coal, coke and briquettes.

Amendments to give effect to these alterations were agreed to.

The Severn Barrage

On February 24th Mr. L. Smith asked the Minister of Transport when he expected to receive the Report of the Committee of the Economic Advisory Council investigating the question of the Severn River barrage.

Mr. Pybus said he hoped to receive the report within the next few months.

Legal

Radio Valve Patent Action

In the Chancery Division, on February 24th, Mr. Justice Eve delivered his reserved judgment on a summons taken by the Tungsram Electric Lamp Works (Great Britain), Ltd., in a patent action against them by the Mullard Radio Valve Co., Ltd., heard on January 26th last.

The summons asked that the plaintiff company should be ordered to supply further and better particulars of its amended statement of claim.

His Lordship, in giving judgment, said the plaintiffs' claim in the action was for an injunction restraining alleged infringement of four letters patent and the alleged importation into this country from Hungary of infringing radio valves.

Shortly before the delivery of the defence the plaintiff company's solicitors wrote to the defendant company's solicitors suggesting that, if its experts were permitted to inspect the processes of manufacture of the alleged infringing valves at the defendant company's works in Hungary, it would save expense in the litigation.

The defendant company's solicitors replied that they were not the actual manufacturers, but while willing to do what they could to save expense, they complained of the plaintiff company's course of issuing threats and in some cases obtaining consent judgments and generally disturbing the trade. In a further letter they said that, in view of the plaintiff company's policy of generally disturbing the trade, the defendant company was unwilling to do anything to assist the plaintiff company to prove its case.

His Lordship said that in the amended statement of claim it was pleaded that the defendant company was a private one promoted for the importation and sale in this country of valves made in Hungary.

As to the relief asked for by the defendant company's summons, in His Lordship's view it was of an oppressive and unreasonable nature. At the moment the plaintiffs could not commit themselves to more than this, that the valves were produced in accordance with processes, the application of some or all of which in this country had infringed their patents. This was made clear to the defendant company, and he did not think the latter was entitled to the further particulars asked for. He was prepared to make an order that the summons should stand over generally, with no order as to costs.

Mr. Shelley, for the defendant company, asked for an adjournment for three weeks, and his Lordship assented to this course.

Claim for Moneys Advanced on Patents

IN the King's Bench Division on Monday last Mr. Justice Rowlatt concluded the hearing of an action by Mr. Wm. E. Storey, Amersham, against Mr. Raoul F. Bossini, London, S.E., to recover the sum of £2,800, money alleged to be due to the plaintiff from the defendant under an agreement.

The matter arose out of certain agreements, entered into between the plaintiff and the defendant, an engineer and inventor, in respect of letters patent in connection with electrolytic rectifiers for alternating electric currents and refrigerators. Plaintiff advanced defendant certain moneys, and his case was that the defendant agreed to give him a third share of the profits which would accrue from those inventions.

Defendant pleaded that the share of the profits of the patents were assigned to the plaintiff in consideration of the moneys advanced, and that defendant had received no profits from the electrolytic rectifiers. With regard to the refrigerator patents, defendant denied that he agreed to pay plaintiff any of the proceeds of the sale of those patents. He also denied that he was indebted to the plaintiff in the sums alleged.

His Lordship, after hearing a mass of evidence, gave judgment for the plaintiff for £944 with costs, except on certain items.

Fraudulent Consumption of Electricity

At Blackburn last week A. Duckworth, described as an electrical engineer, was fined £3 for the fraudulent consumption of electricity from the Corporation's mains. It was stated that the defendant had attached leads to the power main for lighting a shop window.

Another shopkeeper, James Holmes, was fined £2 for using a reading lamp connected to a power circuit.

Co-operation and Education

Proposing the toast of "The Association" at the ninth annual dinner and dance of the West Yorkshire Section of the E.P.E.A., held in Leeds on February 27th, the Lord Mayor of Leeds (Ald. F. B. Simpson) said that members of the Association might take pride in an organisation that had done good not only to its members, but to the electrical industry as a whole. Organisation was a growing need of modern life in every trade or profession.

Mr. H. J. Taylor (president, E.P.E.A.), responding, defined the aim of the Association as doing all it could for the electrical industry, as well as for the members engaged in it. Only by co-operation was it possible to attain the high standard essential for the prosperity of the industry. He referred to the E.P.E.A. correspondence education course recently inaugurated under the direction of Mr. J. W. Thomas, M.Sc., LL.B., and intended chiefly for members living away from the industrial centres.

It was an important part of the work of the Association to see that the right type of men entered the industry. The Association would like to see the Central Electricity Board playing an active part on the Displacements Committee. It was felt that any vacancies that might occur on the Board should be filled from within the industry.

Mr. J. F. Sarvent (hon. secretary of the Section) proposed "The Ladies and Guests," on whose behalf Mr. C. Nelson Hefford (city electrical engineer, Leeds) replied.

Correspondence

Correspondents should forward their communications as early as possible. No letter can be published unless we have the writer's name and address in our possession

These Discounts

Having read the further letter signed by "Fair Play" in your last issue, I am of the opinion that in supporting his contentions it would have been better for him had he succumbed to the temptation to let "sleeping dogs lie," as he now completely confirms my statement of the position, except that he maintains that the discount his firm allows for resale, is the generous (?) one of 10 per cent. in place of the more general 7½ per cent. Is there any firm of electrical contractors whose overheads would be covered by this figure, quite apart from any question of profit?

I am indebted to your correspondent for giving me particulars of his "confidential instructions," but this list of buyers, to whom his salesmen may quote full discount—even though the usual salesman's enthusiasm to sell at all costs is suppressed—is such that I leave it to the judgment of your readers, after perusing the correspondence, as to whether or no I have made my point.

The genuine contractor does not require charity as a "discount snatcher," but expects discounts on his merits.

February 26th, 1932. REAL FAIR PLAY.

I have been following with considerable interest the correspondence published in your columns regarding discounts allowable on motors and motor sales policy generally.

The letter signed "Fair Play" published in this week's issue is illuminating. The consulting engineers' profession must be a very profitable one if, as in the case of "Fair Play's" firm, the consultant receives both the legitimate fee from his client, plus a preferential discount of ten per cent. on every order that he places with "Fair Play's" concern.

It is clear that the consulting engineer is warned not to pass on this ten per cent. to his client, because "Fair Play" strongly objects to motor manufacturers who sell to all and sundry at trade discounts but, on the other hand, I should imagine that there are some consulting engineers who do not approve of the custom of receiving secret commissions, quite apart from the fact that there is a law on the English Statute Book dealing with the subject of secret commission, bribery and other corrupt practices.

February 26th, 1932. A.M.I.E.E.

Trams *versus* Buses

In these times when there are references almost daily in the Press, electrical and otherwise, to the replacement of tramways by bus services, and continual suggestions that such a policy is inevitable with the march of progress, may I suggest that if the electric tramway is really moribund it is not due to any inherent fault in the system, but to the unfair burdens in the way of rates, &c., the tramways have had to bear, and more than anything to the apathy of electrical engineers everywhere.

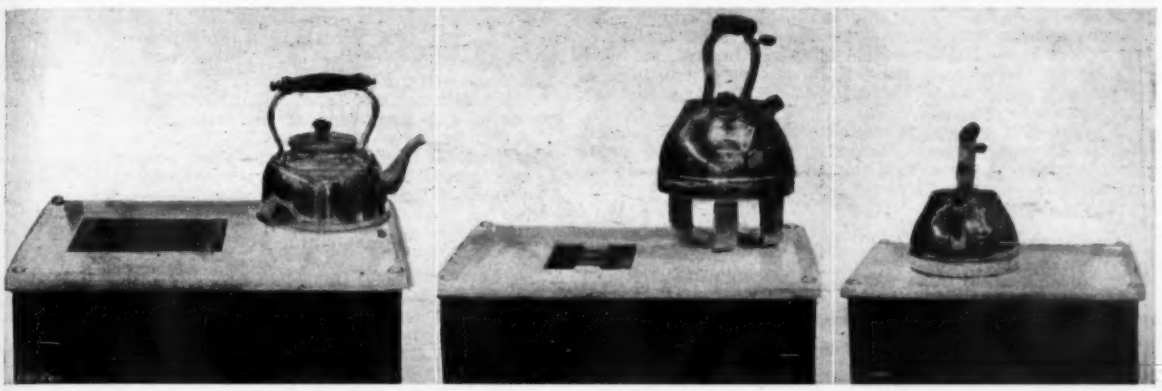
No effort seems to have been made by the electrical industry to combat the inroad of the motor omnibus, so, presumably, if buses do supersede tramways everywhere, the industry will have no one to blame but itself. In the hope, however, of putting a little life into the matter, let us consider the merits of the respective systems.

(*a*) Buses are more costly to operate and in their fares than tramcars, yet people patronise them because in many cases they are quicker than tramcars.

(*b*) Tramcars could be run at speeds as high as those of buses, but are not allowed to. If anyone doubts this, let him take a last car at night to a depôt. Many bus timetables cannot be maintained without excessive speed over at least parts of their stages.

(*c*) In places where great congestion of traffic exists it is considered that the mobility of buses is an advantage, and it probably is in comparison to the low-speed badly run tramways that one sees everywhere. It should, however, be borne in mind that some of the greatest authorities on transport admit that a tramcar can move a great number of people more rapidly than a bus; and, further, at least two buses are required to one tramcar.

(*d*) Comfort is sometimes claimed in favour of the bus, but the position is that without its upholstery the bus is not fit to ride in, whilst the tramcar, if upholstered with the same luxuriousness, will beat it for comfort always; and, further, in a tramcar one is not crammed like a sardine in a tin, as in the majority of motor buses, even those of most modern design.



Demonstration models of Mr. N. W. Gilbert's (Berkeley & Young, Ltd.) induced-current boiling units referred to in our issue of February 19th (p. 256). Left, open plate with fixed grid element; centre, boiling unit with linked transformer leg for special utensils (kettle with "secondary" loops on hobs); right, kettle in boiling position

(*e*) Reading is next to impossible in buses.

(*f*) Perhaps most important of all is the poisonous pollution of the atmosphere by buses, a feature entirely absent in the case of tramcars.

(*g*) The fact that the tramway occupies a fixed position in a road is claimed to be a source of danger, whereas it is actually the reverse; for on the one hand it cannot skid, as buses very often do; and, further, one cannot get run over by it except in between the lines. The only real objection here is from the private motorist, who should not be allowed to overrule the requirements of the majority who have no cars of their own.

One is almost tempted to think that the fact that many electrical engineers are motorists makes them lukewarm in the matter; so perhaps they will go on in the same old way appointing electrical engineers as transport managers, in which capacity they will scrap all electric tramways in favour of petrol- or oil-driven vehicles, and perhaps in the end the gas grid, by similar apathy, will, and deservedly, replace the electrical one. J. BAGGS.

Manchester, *February 23rd*, 1932.

An Electrical Engineer's House

Your contributor "Olton" in his article bearing this title in your current issue, mentions a fact which should give contractors and electricity supply companies food for thought.

Royal Buffet of Delicura, Ltd., at the new Unilever House

Here we have an electrical engineer having to fall back on gas for heating his supply of domestic water, not because electrical water heating was too costly or inefficient, but because no one would take the trouble to go into the matter thoroughly, and give the prospective customer a quotation for fixing, complete with water connections, and leaving in working order.

There are three methods of heating water for domestic use in an ordinary household:—(1) A coke fired boiler, usually fixed in the kitchen or scullery—boiler in the back of the

range or grate; (2) a gas-fired boiler; and (3) an electrical storage cylinder.

No. 1 is certainly dusty and dirty and requires a certain amount of attention and gas has certain disadvantages compared with electrical heating. An electrical storage cylinder fitted with thermostatic control can be installed and forgotten. The other "selling points" need not be gone into now.

My main object in writing is to point out that contractors and supply companies should be in a position to advise customers on electric heaters for the supply of domestic hot water, *and the fixing and installation of the complete heating system*. The electrician and hot water engineer should work together.

I have been in the electrical contracting and hot water engineering business for many years, and so I can look at the question from both points of view, and give a prospective customer the benefit of my experience. Every job must be taken on its merits, and probably requires different treatment. It is therefore the duty of the powers that be to see that they have a man on their staff who is capable of dealing in an efficient manner with inquiries for domestic water heating.

I believe there is a large field for water heaters, provided the business is properly handled. For supply companies it should be a useful load. But if slipshod methods are adopted it will never be obtained.

If prospective business is treated as in "Olton's" case, no wonder experienced men like myself are looking for jobs. Perhaps there is one enterprising firm to whom I could be of use.

February 27th, 1932. F. J. H.

House Service Meters

Would any reader please inform me if a consumer of electricity can demand a slot meter, or is it left to the supply authorities to say whether a slot meter or an ordinary meter is to be installed?

February 29th, 1932. INQUIRER.

The Distribution Problem

In your issue of the 26th instant you report Mr. J. M. Kennedy, at the annual dinner of the Association of Supervising Electrical Engineers, as follows:—

"Out of eight million possible domestic consumers, three and a half million were now connected to the mains. There were still 40,000 sq. miles of rural areas with over 100 inhabitants per sq. mile without any electricity at all; the cost of electrifying these areas would be about £30 million, and the work ought to be done.

"To connect three million consumers in all areas in the next five years would cost some £60 millions, would employ 120,000 men, and call for three million tons of coal per annum, while reducing the value of imported paraffin by £6 million."

It would be very helpful if, when such observations are made, some indication could be given as to (i) how it is proposed to obtain the £30 millions and £60 millions respectively; (ii) the annual sum required for interest and sinking fund charges thereon; and (iii) the estimated price per kWh at which the electrical energy must be sold to avoid losses on the project.

I imagine that in the early years of the development of the scheme, losses will be unavoidable, and it would be interesting to know how it is proposed to obtain the sum required under item (ii) above.

London, E.C.1, *Feb. 27th*, 1932. J. LESSER.

A Worthing Appointment

I observe in your issue of February 19th a letter addressed to you by Mr. D. R. Eastwood.

Mr. Eastwood's communication has evidently been written without full knowledge of the facts. It is true that Mr. W. M. Bailey was recommended for the appointment, but for personal reasons the appointment was found to be impossible, and the position was subsequently re-advertised.

GEOFFREY PORTER,
Borough Electrical Engineer.

Worthing, *February 24th*, 1932.

With reference to the communication addressed to you by Mr. D. R. Eastwood which appeared in your February 19th issue in connection with the above, I feel that some explanation of the true facts of the case is necessary.

It is quite true that I was successful in gaining the appointment which had previously been advertised, but owing to personal reasons over which I had no control I found it impossible to take up the position.

The advertisement referred to by Mr. Eastwood was the second one in connection with this vacancy, but, unfortunately, this appeared in the same issue as the notice of my recommendation.

W. M. BAILEY.

Bradford, *February 25th*, 1932.

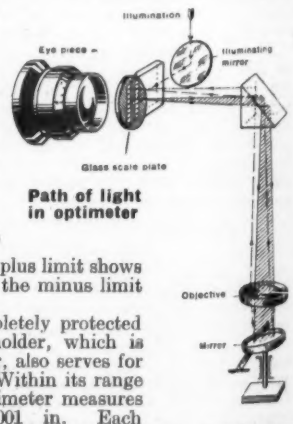
A High-precision Measuring Instrument

THE basic idea underlying the design of the Zeiss "Optimeter," a high-precision measuring instrument supplied by Messrs. Alfred Herbert, Ltd., Coventry, is to render measurement independent of the precision of mechanical elements such as screws, levers, etc., by the projection of images.

A contact plunger is raised for inserting the work by means of an adjustable lever, the movement of the plunger being limited in either direction by stops. The upper end of the plunger is spherical, and supports an inclinable optical plane mirror under spring tension. Due to the comparatively large distance between the axis of inclination of the mirror and the plunger bearing, it is rendered possible to use a low measuring pressure and to maintain it constantly at the same figure. The image of the glass scale seen behind the ocular is projected on the inclinable mirror, the required light being supplied by an adjustable illuminating mirror.

Horizontal optimeter measuring a ring gauge

Since the scale on the glass plate is placed to one side, it is not seen by the observer. Instead, the scale image appearing on the inclinable mirror is reflected from the latter, and after passing the objective and prism, is directed on to the glass scale plate, where it is seen through the ocular. The glass scale plate bears an index line, which thus being stationary, serves as a pointer for the scale image, which shifts in accordance with the movements of the mirror. As long as the mirror is at right angles to the optical axis, the index line is on zero on the scale. As soon as the mirror is tipped by the slightest amount by a movement of the contact plunger, the scale image is deflected due to the changed position of the mirror, and the deviation registered relative to the index line.



Path of light in optimeter

The optimeter tube can be furnished with a tolerance indicator. The tolerance marks comprise one red and one green transparent glass plate, either of which may be moved to cover any area on its half of the scale by turning a knurled screw. In this manner, the upper area of the scale beyond the plus limit shows red, while the field beyond the minus limit appears green.

All optical parts are completely protected from dust. The tubular holder, which is 1¼ in. (27 mm.) in diameter, also serves for clamping the instrument. Within its range of +0.0035 in., the optimeter measures correct to within ±0.00001 in. Each smallest space on the scale represents 0.00005 in. but because of the large distance between graduations as they appear in the field, hundred-thousandths of an inch may be readily estimated.

The measuring pressure is completely independent of extraneous influences as well as of the skill or touch of the operator, being produced solely by the contact plunger spring, a uniform low pressure. The instrument may be used in daylight or ordinary artificial illumination.

Adjustment to the eye is effected by turning the ocular head to the right or left, a scale of ± five graduations rendering it easy to reset it to the eye of any observer.

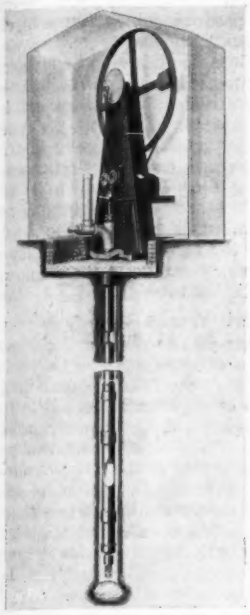
A model with a vertical stand is suitable for use in the testing laboratory and workshop, while another type with a horizontal stand forms an instrument particularly adapted to the measurement of plugs, gauges, etc., and other appliances of this nature.

New Apparatus and Devices

for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

The "Cabala" Pump

The S.A.M. Pump Co., 39, Victoria Street, London, S.W.1, has drawn our attention to an unusual model which is called the "Cabala." It is electrically driven and generally comprises headgear and the pump proper, which is lowered into a deep bore hole or well, no fixings being necessary below ground. The pump cylinder is glass lined, which greatly reduces friction, so that wear is very small indeed. The drive between the pump piston and the headgear is by means of a flexible cable, specially prepared for immersion in water, while the motor drives the crankshaft by an endless silent "Texrope." The crankshaft is connected to the piston cable by a "Coventry" roller chain, suitably guided between pulleys, the whole forming a very compact outfit. A bronze piston and valves are employed.



The "Cabala" electrically driven pump

The advantages of this type of pump include increased efficiency due to reduction of wear by the use of a glass barrel; the cable drive dispenses with pump-rod guides and couplings; and the weight of the cable is only a fraction of that of an equivalent length of pump-rod. Furthermore, the diameter of the cable, compared with that of a rod for similar duty, is much smaller and therefore the stand-pipe diameter is much less also. It will be evident that the first cost of a "Cabala" pump is small, installation cost is not great, and a saving is made in driving power too. Some idea of the last-mentioned factor is given by the fact that a 0.25-b.h.p. motor provides all the power necessary to deliver 200 gallons of water per hour against a head of 200 ft.

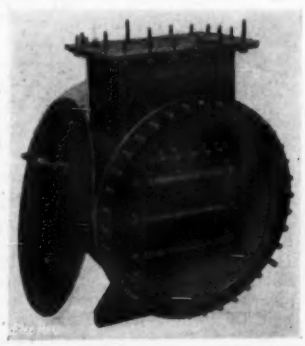
Foot-pad for Radio Equipment, Etc.

Messrs. McLeod & McLeod, 329, High Holborn, W.C.1, have sent us a sample of "Feet-o'-Felt," which they have just introduced for protecting delicate woodwork, &c., with which the feet of various appliances may come into contact. It has a felt pad neatly secured in a metal container with a screw. The device is made in two diameters, ¾ in. and 9/16 in., with screws for metal or wood.

A Flameproof Resistance

The transference of testing authority for flameproof enclosures for electrical equipment from Sheffield University to the Mines Department, and the inauguration of the new testing station at Harpur Hill, Buxton, Electrical Review, July 31st, 1931, page 168, signifies the official intention regarding the type of apparatus which will in future be approved for use in this country's coal mines.

One of the first manufacturing companies to bring its designs into line with the new requirements is the Electro-Mechanical Brake Co., Ltd., Moor Street, West Bromwich, which has produced a new type flameproof resistance in collaboration with the Mines Department, for which a certificate of "flameproofness" has recently been issued.



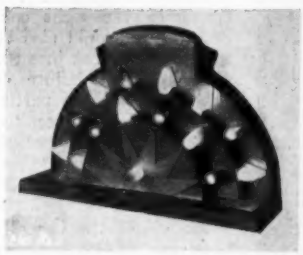
"E.M.B." flameproof resistance

The unit is the standard "EMB" unbreakable, jointless and rustless grid-type resistance. The grids are mounted on mica-insulated steel bars carried on mild-steel end frames suitably arranged for mounting inside the cylindrical portion of the case. The rectangular terminal compartment is welded on to the cylindrical portion and connections between the two parts are made by means of flameproof terminals of moulded insulating material fitted in holes drilled in the main case. No vent or ring relief device is fitted, the case being made strong enough to withstand an internal explosion, without any definite relief beyond the rough machining on the flanges of the covers. Actually the greatest internal pressure recorded in the official tests was only 98 lb. per sq. in., as compared with the manufacturers' pressure test of 150 lb. per sq. in. The resistance case is being made in two sizes to cover all normal requirements.

Repair-shop Pedestal Lamp

A new portable pedestal lamp, known as the "Non-Such," for use in awkward places in motor garages and repair shops, has lately been put on the market by Messrs. John Dunn and Sons, Charles Street, Hull. It consists of a four-legged tubular pillar with an adjustable rod to the upper end of which is pivoted the lamp-holding arm which may be adjusted and fixed in any desired position. A 60-W lamp is enclosed in a shade reflector, so that the light can be concentrated on the job in hand. The sliding adjustment has a length of 30 in., enabling the lamp to attain a maximum height of 5 ft. 6 in. The apparatus is supplied with 25 ft. of cable and plug-in contact.

Decoration Lamp Fitting



The "Osram Rainbow" decoration stand

The General Electric Co., Ltd., Magnet House, Kingsway, W.C.2, has produced a decoration lamp fitting for dance halls, restaurants, &c. It is constructed of asbestos papier-maché, fireproof material, and is designed for accommodating "Osram" decoration lamps with striking effect. It also affords a very fine centrepiece for shop-window displays. The name "Rainbow" stand which the device bears is very apt, and is brought about by the fitting of lamps of various colours to the very effectively designed colour scheme of the stand itself.

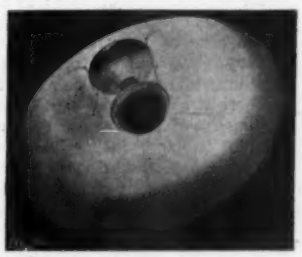
Paint Spraying Plant

The new type AD plant made by the Aerograph Co., Ltd., Lower Sydenham, S.E.26, is a transportable outfit and is of sufficient capacity to operate a full-size spray gun, and is within the reach of the average painter and decorator and the smaller refinishing shop. It includes a twin-cylinder air compressor with a capacity of nearly seven cubic feet of compressed air per minute. It can therefore easily maintain a steady pressure for a full-size standard spray gun exactly as used in the big factories. The compressor is driven either by an electric motor or a petrol engine by means of a very efficient V-belt. The air receiver has stoutly welded seams and a type M.C. oil and moisture separator is fitted to the outlet.

The equipment is bolted to a substantial steel chassis fitted with a convenient push-bar and large swivelling wheels. A "Superplus" spray gun is provided, which produces either a wide vertical or horizontal fan spray for large surfaces or a round concentrated spray for "touch up" work or smaller surfaces by simply turning the air cap with the fingers.

A Light Diffuser

Visitors to the exhibition of French Art at Burlington House will have noticed the new system of lighting which has been installed in the galleries. The contractors responsible for the provision of the equipment were Messrs. Belshaw & Co., Ltd., 68, Victoria Street, London, S.W.1, and the lamps used are of the "Fortuny" diffuser type made by the Società Anonima Leonardo da Vinci, Foro Bonapart, 2, Milan. Each lamp consists of two reflectors and a diffuser; the latter is an aluminium cap, the internal face of which, coated with dull white, forms the diffusing surface. The lamp is fixed at the centre of the inside of the cap and projects from the upper reflector, which is of a special shape of a predetermined area. The lamp is shielded below by a lower reflector consisting of a spheroidal case having a specially-designed concave surface. The rays emitted by the lamp illuminate the diffuser partly directly, and partly by the two reflectors. From the diffuser the light spreads out to give a uniform and soft effect.



Interior of the "Fortuny" fitting

The "Fortuny" diffuser lamp is equally advantageously applicable to either inside or outside lighting.

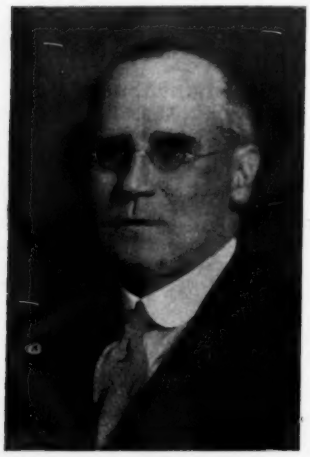
The fitting may be fixed or suspended in any of the usual ways. The standard type is made in two sizes: for concealed vertical use, 620 mm. in diameter and 270 mm. in height, taking a 500-W lamp; for adjustable suspension, 1,020 mm. in diameter, and 375 mm. in height, taking a 1,500-W lamp.

Organising Export Business. By H. C. Siddeley, M.I.E.E.

How the group system can be made to succeed

MANY attempts have been made to extend the export business in the electrical industry by systems of group working during the past ten years, but these have not met with the success which might have been expected.

The groups usually consist of manufacturers, each specialising in a limited range of products, but not sufficiently large to justify having their own selling organisation abroad. The group is generally arranged so that the constituent members between them produce a more or less complete range to enable them to compete with the large foreign firms, mainly concerns with headquarters in the U.S.A., who each cover a wide field.



Mr. H. C. Siddeley is proceeding to Buenos Aires shortly to take up a position as "electrical trade ambassador" under the combined auspices of the B.E.A.M.A. and the Department of Overseas Trade

It is interesting therefore to examine the system carefully to see if there is any reason why this method of working could not be made successful, given the right conditions. It would also be instructive to look into the reasons for past failures or let us say for the partial success which has resulted and then to see if there is a basis on which successful co-operation can be achieved.

The system has usually been applied to countries where the British export business has not been very extensive. There were two reasons for this: First, the desire to extend business in these countries, and second, the fact that very few firms had any existing agency arrangements in such countries. They were therefore more inclined to try the experiment under these conditions, as it did not necessitate any alterations to existing arrangements.

Covering a Number of Markets

The fact that such countries were new to them made the experiment more difficult, and in many cases the effort was abandoned before the organisation had been able to make good against the foreign competition which was already well established there. A further handicap has been that in no case known to the writer have the same group of manufacturers been organised to operate in more than one country. Thus there is a vast amount of work and expense incurred in preparing the necessary staff, literature and general information concerning the products of the members, which, if spread over more markets, would not have entailed a prohibitive cost to each.

It has to be remembered that such companies have to meet the co-ordinated competition of their foreign rivals, who have their literature and information very carefully compiled to cover all their productions and all this in one set of catalogues. The cost of preparing an adequate catalogue setting forth the productions of the various participants, in a foreign language, is very great, and can only be undertaken when the expected resultant turnover can be made to justify it.

These two difficulties can, of course, be overcome if the group having spent the money for the preliminary preparations are content to carry on the business for sufficient length of time to obtain a successful return. The idea behind group working is the development of an organisation comprising firms manufacturing a limited range, so that they can compete on level terms in foreign countries against large foreign manufacturers such as the A.E.G., American General Electric, Siemens & Halske, &c., who make an entire range of electrical manufactures in their own works. These large makers have all their home and foreign selling organisation concentrated on the same range of products. Their whole series of publications, advertising material, &c., is devoted to materials well known to their own staff; consequently their foreign branches are immediately in a most favourable position to obtain business.

A Complete Co-ordinated Range

While it cannot be said that the whole output of such large firms is the best of its kind, it has many advantages as compared with the productions of any group which may be formed, unless such a group are prepared to revise their range of products in such a way as to obtain among themselves a homogeneous and complete range which will have a reasonable chance of competing successfully.

The chief weakness of any group which has hitherto operated has been that its operations have not been applied to the whole of each member's business and sufficient consideration has not been given to the production question. This system has so far only been considered as one to obtain a better selling organisation. This does not go far enough, for before it can be successful it must be given products which can compete with those of rivals both in quality, price and range.

The provision of such a complete range can only be obtained if each member of a selling group revises his productions in such a way that no two members are making the same article. By so doing each one can concentrate his efforts on fewer patterns with the possibility of a considerable reduction in cost through a much larger turnover in each. By being associated with another firm making the designs which he has abandoned, the manufacturer is not handicapped through not providing these, as his fellow member should be able to supply his needs in this respect (say for the home market) at a lower price than that at which he formerly produced them himself and no doubt of even better quality and design.

The Specialist Works

It is still my profound conviction that the best and cheapest production is achieved in a works of moderate size under the personal supervision of one man deeply interested in its success, provided that the range of patterns is limited to the size of that works. It is also important that discrimination should be shown in the selection of the constituent members. Their products should be such as appeal to the same *clientele* and as far as possible such as can be handled by the same staff. An engineer expert in turbo-alternators would not necessarily be equally conversant with the points of a domestic cooker, but the turnover should be sufficiently large in each territory to maintain engineers with varying qualifications.

If, therefore, any group of manufacturers, who are now by themselves unable to organise their own export business, will agree to create such an organisation with the object of looking after their sales throughout the world, and if they are determined to take full advantage of their association with other makers to reconsider together their range of productions, then the group system will get its real opportunity to prove itself successful in obtaining sufficient foreign business to compensate for the trouble taken and the expenditure involved.

The directors of the selling company would be selected from the members of the group, but their first endeavour should be to create a successful selling organisation in each territory from which eventually each member will reap the benefit in the form of orders for his own works.

Essential Conditions Summarised

The conditions necessary to the success of such groups may be summarised as follows:—

A selling organisation, preferably a separate limited company, covering all foreign markets.

A list of members whose products are sufficiently allied in type.

The restriction of each member's range of production to cut out any overlapping.

Efficient production by each member.

The issue of a catalogue comprising all members' productions as if they were the products of one company, which must be printed in foreign languages.

An independent staff to control all export business with its own office situated preferably in London.

Argentine Electricity Production

The two principal electricity supply companies in the Argentine Republic have furnished Messrs. E. Tornquist & Co., of Buenos Aires, with figures of the production of their stations during the last four years. These statistics, which are of considerable interest in view of the renewed attention now being paid to the Argentine market, are summarised below:—

ELECTRICITY GENERATED.
(In millions of kWh.)

Cia Hispano-Americana de Electricidad.

Year.	Light.		Power and Traction.	Total.
	Public Lighting.	Private Lighting.		
1931	35.7	220.5	512.8	769.0
1930	36.6	223.7	492.1	752.4
1929	31.6	208.2	445.0	684.8
1928	28.4	198.3	398.8	625.5

Cia Italo-Argentina de Electricidad.

Year.	Light.		Power and Traction.	Total.
	Public Lighting.	Private Lighting.		
1931	16.4	68.7	74.4	159.5
1930	20.1	68.0	71.5	159.6
1929	16.0	62.0	66.0	144.0
1928	14.0	54.5	57.8	126.3

The Brazilian Trade Situation. By William T. Taylor, M.I.E.E.

What British manufacturers must do to secure business

THOSE parts of Brazil most amply supplied at the present time with electricity cover vast areas in the States of Bahia, Minas Geraes, Pernambuco, Rio Grande do Sul, Rio de Janeiro, Sao Paulo, and Santa Catherina. Many of these States are blessed with a superabundance of water power; the potential water power of the United States of Brazil are in the neighbourhood of 30,000,000 h.p., of which no more than about one-fiftieth part has so far been developed.

Owing to the differences which exist with regard to such factors as mineral and other natural resources, water power potentialities, distances from the European and American markets, distances of inland towns to the coast, anticipated future development of the vast hinterland, and, in no small measure, to the number and magnitude of foreign-owned electricity undertakings, &c., the two greater South American republics (Argentina and Brazil) cannot be compared on the same footing from the standpoint of present or future British electrical trade possibilities. Our trade with Brazil is but a quarter that of Argentina, yet Brazil's sources of power are six times greater; our trade weakness is thus evident from the above.

Mr. W. T. Taylor, who has had a great deal of electrical experience in South America

However, comparisons cannot very well be made because the question involves too many complex, variable and uncertain problems. In Brazil we have the open markets of cities, towns, urban, and rural areas, with a population highly developed in tastes and habits, ambitious almost to the extreme, and long accustomed to a standard of living at least as high as our own. But in this vast outlook we must not forget that our representatives have to combat more than solid entrenchment of capable competitors and deep penetration of foreign competition.

Foreign Penetration

Electrical development in Brazil owes much of its importance to the early enterprise and daring of two outstanding groups of financiers and engineers; in particular, Messrs. Guinlie e Cia. (a firm of Brazilian financiers and enineers). and the Dr. F. S. Pearson group of American and Canadian financiers and engineers. These two independent, and at one time hostile, groups of pioneers were responsible for studying and finally acquiring concessions, and for developing some of the largest electrical generating, transmitting and distributing systems in Brazil.

For a number of years the firm of Guinlie e Cia. held the sole representation of many of the world's principal electrical, hydraulic, mechanical, and industrial engineering products for the whole of Brazil; at the same time they owned and operated large hydro-electric undertakings and e.h.p. long-distance transmission systems. In fact, illustrating but one instance of the outstanding business merits of this firm's pre-War activities, from which we may gain something, they sent out a technical representative to examine and advise *gratis*, and report upon the numerous Brazilian-owned electricity supply undertakings scattered throughout the two great industrial States of Sao Paulo and Minas Geraes for the purpose of improving business relations. I carried out this work for the firm while on their regular staff.

In pre-War days some of the largest and best electrical utility concessions and holdings were offered to British financiers or firms who either took them too lightly, viewed them narrowly, or looked upon them as too uncertain or unprofitable or unsound. Since then we have had occasion to see the results of missed opportunities, and with increasing years the necessity has arisen to secure a higher and still higher percentage of the gross total demand for electrical supplies going into the country. We are shown how superficial our business is, and how prevailing conditions of the market indicate to the United Kingdom where it is placed in respect of electrical business, and, of the total Brazilian requirements, we are shown why those capitalists and engineers who have scooped in practically all the best and largest electricity undertakings must assuredly send almost all their orders homewards.

Worth a Greater Effort

Electrical holdings and developed conditions as they now stand, point to us and say, "As you have allowed the years to slip by, problems are placed in your way that now make it more than increasingly difficult for you to attain your expectations." Nevertheless, we should rest assured that the general market is large enough to justify a much more determined effort on the part of the British manufacturer than is being made to meet present-day American and German competition, and, as we cannot now afford to despise little things, we must act promptly and properly or else these remaining many little things will go into our competitors' hands.

Comparing foreign holdings in Brazil: from the electrical standpoint America easily occupies first place, with Germany second but far behind yet well ahead of the United Kingdom. And in consequence of their extensive holdings these two great nationalities must surely strengthen their already favourable position in the Brazilian market, and as time goes on they should be able to obtain business with relatively smaller endeavour and at less cost and require a smaller sales organisation than ourselves. On the other hand, we in the United Kingdom have not only withdrawn more of our Brazilian representatives, but we have sold the electricity undertakings upon which we relied for business—sold them to Americans—thus giving America a still stronger competitive power in Brazil.

This condition, pointing as it does to a weak position that must weaken with coming years, is not the only one which requires attending to. We cannot claim to have local selling organisations and the right home and local co-operation, credit facilities, &c., in all their thoroughness as good as those of the leading American and German business houses, yet we can to-day claim to have cheaper money and cheaper goods, and probably we are disposed to go much farther in the extension of credits and risks, but it is questionable whether we are prepared to go to the expense of making a closer study of local publicity media, a more effective advertisement campaign, and an exhaustive follow-up propaganda by an efficient organisation properly situated.

An "Electrically Minded" People

From my wide experience in Brazil and other Latin-American republics I have no hesitation in saying that the Brazilian has long been much more electrically minded and ambitious than the Englishman, and although many of the towns are very much more remotely situated and are separated by many thousands of miles from electrical manufacturers (such as ourselves) the inhabitants have long been accustomed to safe and economical rural electrification built along sufficiently sound technical lines. From the "heavy current" electrification point of view we have nothing to teach Brazil, but we have certain differences and difficulties to overcome in order to most economically fit in our standards to the existing American and German owned systems, &c., so predominantly evident in that great country.

Business in Brazil not only has its hazards, but it has a wide and uncertain range for any particular hazard. Tact and resourcefulness are necessary to overcome these handicaps as they arise, and the right representation is the only proof of what a firm can and should do to be prosperous.

Business cannot wait for a home decision—a practice of ours far too common in Latin-American business affairs. A representative should be able to perceive and decide (and be allowed to decide) and be ready to adopt better ways of doing things regardless of the fact that for years he has followed particular ideas or methods in this country or elsewhere. In social and business dealings he should study the characteristics of the Brazilian and be alert to discover and profit by his own mistakes in business—the Brazilian is, as a rule, very sensitive—and in business the representative should possess more than the ordinary vision and foresight to understand and see through the promises, &c., of his clients in order that he may be able to anticipate in advance the true position.

Studying Competitors' Methods

A decrease in our electrical trade difficulties in Brazil is intimately associated with the co-operation of home and local organisations and in their closer understanding of not only what is to be done, but of the best, quickest and most economical way of overcoming difficulties and of getting business done. The most successful firm and representation will assuredly be that knowing the most about their competitors' business, the manner in which they conduct it, and with whom they

are doing it. Knowing everything possible about the other firm's business is one of the standing advantages which our competitors claim over the matter-of-fact Englishman's way of doing business. The Englishman's way is not necessarily *British*.

It is true that firms in the United Kingdom doing business in Latin America have of recent years improved their ways, but it is necessary to pay still more attention to manufacturing not only what is needed, but to applying better methods of introducing goods and to a more prompt placing of the goods required. Local interests and requirements should be studied and catered for on the spot—substitutes will not do nowadays. The high standard of our products is already well known, but this merit in itself is far from sufficient to secure business where the margin now left us is so narrow.

The Fiscal Position

Although the currency and internal affairs of Brazil have not been bright of late years, and while questions of preferential tariffs are at the moment somewhat in the melting pot due in part to the newly introduced Empire preference and easements, we have still less reason nowadays to think that it is not worth while to get together and co-ordinate our long experiences with Brazilian trade problems and endeavour in some way to increase present and possible future opportunities in that country. If we do not, others will.

Given adequate attention at home, as well as locally in Brazil, our prospects of improved market conditions should be promising, but some time is likely to elapse before there is a definite resumption of a general upward movement. The situation may be complicated by changing currencies and conditions, and the necessity for immediate cash payments for goods, but reciprocal credits may now assist to meet the emergency and help to improve trade relations between the two countries. Present currency is against foreign purchases by us.

We cannot of course lose sight of the fact that, due to the vast ramifications of American holdings in the electrical field throughout Brazil—indeed, throughout the whole North and South American Continent—which of recent years has proved objectionable and increasingly painful to the minds of many Brazilians—electrical trade with the United Kingdom is at a greater disadvantage than is generally realised by manufacturers and business houses in this country. Nevertheless, there is no good reason why we should not send the best representatives there to carry into effect the most efficient business methods best suited to present needs there.

Joint Representation

Long ago the best American and German houses in Brazil either sold their products through one joint selling organisation, or combined a number of non-competing manufacturing firms and made the best possible arrangements for a joint selling organisation as the most efficient and economical method of doing business. As this is a proved necessity, why should we not go one better? Their houses carried out, and still carry out, a wide and efficient business-getting campaign; they get one non-competitive line to help another; and derive advantages in other ways. In this, or in a somewhat similar direction, our opportunity lies, but we must be willing to take greater risks than we have done, and we must be less indifferent to local requirements than we have been.

The United Kingdom recently made a vigorous attempt to foster the right spirit and increase general trade with the Dominions. But who can foresee the effect that this propaganda will have on Latin American countries? We should, of course, endeavour to take a more determined step to increase electrical trade with Brazil, just as we are now doing with Argentina, by sending a highly efficient and thoroughly competent commercial engineer to that country.

Not unlike Brazil, Argentina offers a promising and increasingly important market for British electrical goods while (and only while) British representatives make the fullest use of, and locally press forward, their products and importance.

This problem of trade is not answered in goods only, it has a far-reaching human story to unfold. That is to say, Latin America, no less than the Dominions overseas, have reached a stage where they seek to engineer and manage their own interests without foreign or outside advice or help, and, due to local patriotism and other ties in the respective countries, the day is not far distant when English engineers and others will find it almost impossible to get employment in those countries unless we continue to possess and/or acquire more electricity and other public utility undertakings, &c., thus following the far-sighted policies of America, Germany and others. Let this be a warning to those at home!

Notes from Canada (BY OUR CANADIAN CORRESPONDENT)

THERE has been in existence for some years a "Canadian Association of British Manufacturers," but it never seems to have been very active. The newspapers recently announced that this Association had decided to cease operations as a separate body and, instead, to affiliate itself with local Boards of Trade.

These new sections of the Boards of Trade will include those interested in the development of British trade with Canada, and it is understood that several electrical firms are already represented.

Direct union with a large and influential organisation should enable the former members of the Association to act more effectively than hitherto and both British and Canadian firms, being members of the same body, should, as a result, learn to understand each other, and each other's problems, better.

The St. Lawrence Scheme

The St. Lawrence development scheme is again in the public eye—this time due to a statement by the Prime Minister of Canada, Mr. Bennett, to the effect that if Canada is to decide at all on this matter she must do so quickly, since there is a counter proposal in the United States to construct a great canal linking Lake Erie with the sea *via* New York State.

This would be an all-American canal and, besides making the canalisation of the St. Lawrence commercially impracticable, would probably mean the carrying of the greater part of Canada's wheat crop over an American route to an American seaport.

Furthermore, the development of water-power on the St. Lawrence would be made more costly. This fact, probably, will call forth some opposition to the all-American canal scheme from the power interests in New York State, as opinion over the border is not by any means certain to be unanimously in favour of it.

A large G.E.C. sign in Auckland, N.Z.

Domestic Electrification Progress

In a review of 1931 one of the leading Canadian newspapers recently published the following figures relating to the number of domestic electrical appliances.

These appliances alone are estimated to have consumed during 1930 nearly 1,000 million kWh. In 1930, 223,200 radio sets were placed in service.

There are in Canada approximately 2,142,800 houses, of which more than 1,500,000 are wired for electricity; about 127,700 houses were connected up during 1930.

Appliance.	Estimated no. in use at the beginning of 1931.
Refrigerators	85,000
Cookers	210,000
Irons	1,260,000
Vacuum cleaners	350,000
Water heaters	84,000
Toasters	560,000
Washing machines	350,000
Fans	70,000
Radio sets	800,000

The output of electricity during 1931, reduced as it was by the lessened demands of industry, would have been considerably lower had it not been for increased domestic use. The annual increase in domestic demand is said to be about 14 per cent.

Research

There is in course of construction at Ottawa a large laboratory for the use of the National Research Council.

Besides laboratories for general engineering work and for aeronautical research, there will be an electrical laboratory and a special high-pressure department where voltages up to 750,000 will be available. Some of the laboratories will be in use this year.

Business and Industrial Notes

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations, and Failures

Lamp Price Reductions

Reductions in the prices of electric lamps as from last Tuesday, March 1st, are announced by the Electric Lamp Manufacturers' Association of Great Britain. In general the reductions are as follows:—Pearl lamps: 25 to 60 W, from 1s. 10d. to 1s. 9d.; 75 W, no change; 100 W, from 2s. 9d. to 2s. 6d. Clear gasfilled lamps: 25 to 60 W, from 2s. 1d. to 1s. 11d.; 75 W, no change; 100 W, from 3s. 3d. to 3s. At the same time other reductions are being made in lamps of similar wattage at odd voltages, and also for special lamps such as sprayed, opal, daylight, &c. No reductions are being made in the ordinary higher wattage lamps at the popular voltages.

The makes of lamp affected are:—"Bell" (British Electric Lamps, Ltd.); "Cosmos" (Metropolitan-Vickers Electrical Co., Ltd.); "Cossor" (A. C. Cossor, Ltd.); "Cryselco" (Cryselco, Ltd.); "Ediswan" (Edison Swan Electric Co., Ltd.); "Elasta" (Pope's Electric Lamp Co., Ltd.); "Foster" (Foster Engineering Co., Ltd.); "Mazda" (British Thomson-Houston Co., Ltd.); "Neron" (Neron Lamps, Ltd.); "Orion" (Orion Lamps, Ltd.); "Osram" (General Electric Co., Ltd.); "Philips" (Philips Lamps, Ltd.); "Siemens" (Siemens Electric Lamps & Supplies); "Stearn" (Stearn Electric Co., Ltd.); "Stella" (Stella Lamp Co., Ltd.); "Tungsram" (Tungsram Electric Lamp Works (Gt. Britain), Ltd.); and "Z" (Z Electric Lamp & Supplies Co., Ltd.).

We have received publicity matter from the following relating to the reductions:—Pope's Electric Lamp Co., Ltd. (folder No. 6179); Metropolitan-Vickers Electrical Co., Ltd. (folder No. 4102/6 and a wall chart); General Electric Co., Ltd. (publications O.S. 6174 and 6176, a wall chart and an illustrated price list respectively); British Thomson-Houston Co., Ltd. (a window bill and a price list); Siemens Electric Lamps & Supplies, Ltd. (list No. 501 and a window-bill); and the Metropolitan-Vickers Electrical Co., Ltd. (a wall chart). These and a number of other manufacturers announce their reductions in our advertisement pages to-day.

New Electrical Showrooms at Bingley

At a recent meeting of the Bingley Urban District Council a motion was submitted for the sale of premises purchased for electrical showrooms. After some discussion an amendment was carried that the premises be opened forthwith as a showroom and offices for the Electricity Department. Sanction was received to a loan of £3,600 over twelve months ago and the building was purchased for approximately £1,700, but owing to opposition by the "economy" group of the Council no further progress had been made.

Electrical Exhibition at New Moston School

Nearly 700 people attended the demonstrations of electrical apparatus at an exhibition held recently by the Manchester

A section of the display at St. Chad's Schools

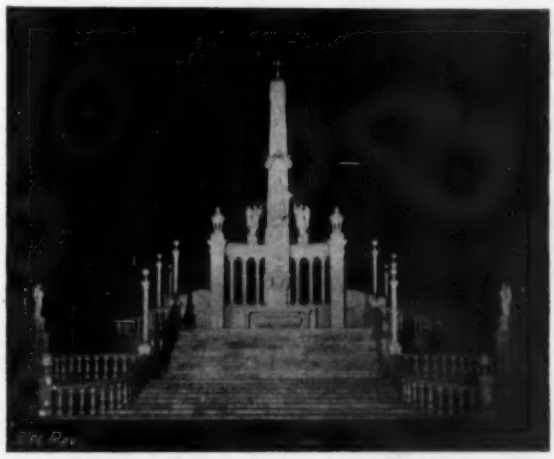
Corporation Electricity Department at St. Chad's Schools, New Moston. In addition to cooking apparatus, which figures prominently in our illustration, other domestic appliances—refrigerators, vacuum cleaners, water heaters, radiators, as well as smaller appliances, were exhibited. Normally, the hall is heated by gas, but this was substituted by electric heating, Messrs. Ferranti, Ltd., lending eight of their wall-type radiators.

New Australian Tariff

The new Australian tariff schedule provides for the reduction of the duties on 69 articles, for the increase of those on 11 articles, and for the repeal of 19 special duties. The majority of the iron and steel duties are to revert to the rate in force before the tariff changes made under Mr. Scullin, but the duty on galvanised iron is not reduced. The duties on electrical appliances are among those increased. Forty-three kinds of articles have been removed by the Federal Government from the list to which the prohibitive import duty applies. These include electrical appliances, dry batteries, dry cells and electric irons.—*Reuter* (Canberra).

Floodlighting in India

The accompanying view of the Monument at St. Patrick's Church, Karachi, shows one of the first in India to be floodlighted. This fine structure is 45 ft. high and is illuminated



The floodlighted Monument at St. Patrick's Church, Karachi

from a distance of about 150 ft. by 1,000-W G.E.C. floodlights fixed on 16 ft. pillars. The installation was carried out by a local contractor.

Rumanian Lamp Industry

It is reported from Bucharest that the Standard Electrica Romana has decided to establish a large incandescent lamp factory in Rumania. It is reported that the Government will participate in this development.

A Sub-contractors' Federation

At a meeting of representatives of trade associations of sub-contractors and interested firms, held on February 22nd at the offices of the Builders' Merchants' Alliance, it was decided to form a new federation under the title of the National Federation of Specialists and Sub-Contractors, and the following were unanimously elected to act until the annual general meeting to be held early in 1933, with powers to co-opt additional members: President, Mr. T. H. McIntyre; treasurer, Mr. J. L. Musgrave; general secretary, Mr. Percival Foddering; members of Council, Col. W. A. Braithwaite, Capt. M. B. Buxton, and Messrs. J. H. McDermid, C. France, H. J. Cash, W. Morris, and F. A. Norris. Membership is restricted to associations of trade, associations of builders' merchants, other associations of suppliers of goods, and firms interested in specialists' work of the building and allied trades. Firms to whom membership through a constituent association is not available may be admitted to associate membership at the discretion of the Council.

The objects of the Federation are: (1) To deal with all questions (excluding wages) affecting the general interest of all or any of its members; (2) to formulate and recommend for adoption by the members any course of action consistent with the general policy of the Federation; and (3) to consolidate good relationship and understanding between specialists, sub-contractors, architects, consulting engineers, surveyors, and builders. Among the bodies represented at the meeting were the Confederation of National Associations of Sub-Contractors, the Electrical Contractors' Association, the Cooking Apparatus Manufacturers' Association, the National Association of Heating and Ventilating and Domestic Engineering Employers, the Joint Committee of Specialists' Associations, and the Federation of British Industries.

The annual subscription of a constituent association is to be 1s. for each member with a minimum of two guineas and a maximum of fifteen guineas; an associate member will pay two guineas.

Conditions in Morocco

A report relating to economic conditions in Morocco has just been issued by the Department of Overseas Trade. With regard to the French Zone it is stated that, although as a primarily agricultural country it has undoubtedly been affected gravely by the world economic depression, it claims to have been less hard hit than many other countries, and the general situation seems to be improving. The electrical market is one which has been little exploited by British manufacturers, and French makers have been allowed to get most of the trade in radio apparatus, which is slowly growing in importance. What is of particular interest to the British exporter is that Morocco is one of the few countries where—by treaty—the Customs duties are the same for him as for his French and other competitors, *viz.*, 12½ per cent. The Spanish Government has spent a large amount on public works to open up the naturally poor area of the Spanish Zone, but there has been no spontaneous colonisation or development on the part of private persons, firms or financiers. The bulk of the trade of the Tangier Zone is an entrepôt trade with the two neighbouring zones.

Czecho-Slovakian Import Restrictions

The *Board of Trade Journal* gives a further list of goods the importation of which the Czecho-Slovakian Government is to prohibit except under licence. The regulations do not apply to consignments handed to a public transport company by

The London Electric Wire Co. and Smiths' staff gathering

February 16th. The articles covered by the list include telegraph, ringing, signalling and railway safety apparatus; telephones and microphones; lightning arrestors (except lightning conductors); electric calculating and measuring machines; switch and contact devices, mounted fuses and the like, electric conduction apparatus, electric lamps; mounted holders for lamps; and mounted glasses for lamps, except reflectors and automobile lamps.

Commercial Electrical Travellers

The annual dinner of the Electrical Trades Commercial Travellers' Association was held on Friday last at the Connaught Rooms. Major-Gen. Sir Philip Nash, the Association's president, was prevented from attending owing to illness and his place was taken by Mr. F. V. Hasemore. Mr. L. Ashman, who presided, said that the Association had received letters from a number of companies asking for commercial travellers, and it had placed a number of men. It was rapidly establishing itself and now included fourteen vice-presidents of standing in electrical firms of repute. Mr. Hasemore said that despite depression they were optimistic regarding the future, and it was the commercial traveller to whom they looked for confidence. He hoped that all electrical companies would bear in mind the Association when requiring travellers.

Mr. H. W. Roberts, in proposing "The Association and its Charities" said that the grid must be loaded, and supply companies would be looking for men who could bring in consumers—men of the calibre of the electrical travellers. Mr. Ashman, in responding, gave details of an unemployment scheme for travellers, and expressed the hope that foreign companies establishing factories in England would apply to the Association for men. He appealed for support for the Association's charities, which include contributions to the Commercial Travellers' School and the E.T.B.I.

The guests were proposed by Mr. W. T. Rushton, Mr. E. W. Jones responding, and Mr. F. C. Chown proposed the chairman's health.

New French Companies

Among the concerns recently organised in France are the following: La Société Office Franco-Allemand de Matériel Electrique Paris (54, Avenue Marceau) to finance electrical undertakings in France and Germany. Six of the largest electrical engineering concerns in France and the A.E.G. Co. and the Siemens-Schuckertwerke Co. of Berlin are interested in the new undertaking; La Société d'Etude de la Dranse de Morzine, Paris (18, Rue de Madrid) to prepare schemes for the establishment of hydro-electric power stations on the River Dranse de Morzine in the Upper Savoy Department; La Société Electrique et Radiophonique de l'Est, Nancy (12-14, Rue des Dominicains); and La Société Parisienne de Lampes Electriques à Incandescence, Paris (11, Rue de Rocroi).

Local Exhibition

A prominent position was taken by the City of Birmingham Electric Supply Department's stand at the Brighter Homes Exhibition held recently at Bingley Hall, Birmingham. The Exhibit comprised a comprehensive selection of modern lighting fittings, electric cookers, water heaters, washing machines, vacuum cleaners, grills, toasters, kettles, irons and various labour-saving appliances. The Exhibition was well attended and the stand attracted a good deal of favourable attention.

Visit to Accumulator Works

On February 18th a party of sixty third-year Faraday House students, under the charge of Mr. A. Regnauld, senior lecturer at Faraday House, visited the works of Pritchett & Gold and E.P.S. Co., Ltd., Dagenham Dock, Essex. The party was conducted through every department of the works, and was shown the various processes employed in the manufacture of accumulators.

Social Events

The second whist drive and dance organised by the social committee of the Torquay electricity undertaking was held at the medical baths on February 18th and was attended by over two hundred guests, sixty of whom took part in the whist drive until 10 p.m. The prizes were presented to the winners by Mrs. J. W. Lane. The M.C. for the whist drive was Mr. R. W. Rowe, while Mr. F. C. Day officiated in a similar capacity for the dance, which continued until a late hour.

The annual staff dinner of the Nottinghamshire and Derbyshire Electric Power Co., Ltd., was held recently, Mr. A. D. Phillips, managing director, presiding. Mr. E. A. B. Chrich, mains superintendent, in responding to the toast of "The Company," referred to the great progress made by the company and especially to the new 33,000-V transmission line, which would supply East Nottinghamshire.

The staff of the Leyton factory of the London Electric Wire Co. and Smiths, Ltd., held its annual dance at the First Avenue Hotel, London, on February 24th. About 200 members and their friends spent a delightful evening together; the board of directors was well represented. Music was provided by Lloyd Shakespeare and his band and an all-too-short evening concluded at midnight with the singing of "Auld Lang Syne." Our photograph is by the Nonflash Banquet Photo Co.

The annual dinner of the North Metropolitan Electric Power Supply Co. will take place at the Café Royal, Regent Street, W.1, on March 8th.

Committee chairmen, engineers and staff members of joint electricity undertakings in Blackburn, Preston, Blackpool, Lytham St. Annes, Darwen, Fleetwood, and Thornton attended a social gathering held at Blackburn on February 25th. Mr. W. A. Royle, engineer and manager at Blackburn, presided. Councillor Ingham said the future prosperity of England, and Lancashire in particular, depended largely on electric power which could only be brought about by united organisation of various municipalities under the grid system. He complimented engineers and assistants on the speed and efficiency with which they were carrying out extensions to electricity services. Councillor Whittaker said the Central Electricity Board was taking over various undertakings but the position of the staffs would remain the same. There need be no fear of dismissals.

Conditions in Siam

A copy of a confidential memorandum on economic conditions in Siam at the end of the third quarter, 1931, prepared by H.M. Consul-General at Bangkok has been received and issued by the Department of Overseas Trade to firms whose names are entered on its Special Register. United Kingdom firms wishing to obtain a copy should apply to the Department, 35, Old Queen Street, S.W.1, quoting reference No. C.X.3818.

Lighting of Blackburn Market

Blackburn Market, one of the largest and finest in the North, has recently been equipped with electric lighting, and now every one of the 370 stalls has a minimum of two lamps, the average being about 3½. Tenants are charged 6d. per day for the first two 100-W lamps, and 4d. for each additional lamp of the same size. The scheme has been carried through by the Corporation Electricity Department, and has cost £2,000.

Polish Electrical Machinery Imports

Imports of electrical machinery into Poland during December last were valued at 467,000 zloty.

Southampton Docks Handbook

The Southern Railway Company has just published a handbook containing over 200 pages relating to the Southampton Docks. With a number of excellent illustrations, diagrams, and maps, the book gives an idea of the advantages the port has to offer and the different kinds of trade that are carried on there. Full particulars of the import and export rates are included, together with general regulations, conditions and bylaws in connection with the docks.

Research and Personnel Management

At a meeting of the Business Research and Management Association of Great Britain to be held on Tuesday next, March 8th, at Anderton's Hotel, Fleet Street, E.C., Dr. C. H. Northcott, labour manager of Messrs. Rowntree & Co., Ltd., will give an address on "Research as a Factor of Personnel Management."

Recent Contracts

Messrs. Reid, Ferens & Co., Newcastle-on-Tyne, have received a contract from the Cleveland and Durham Electric Supply Co., in connection with the electrification of the southern part of North Yorkshire and the change-over from d.c. to a.c. The contract includes the erection of over 50 miles of overhead h.p. lines for carrying electricity from the Central Electricity Board's transformer station at Yafforth to Easingwold. The contract will occupy six months.

The Sunbeam Vacuum Cleaner Co. has received from the Sultan of Johore an order for vacuum cleaners.

Messrs. Frederick Thomas & Co., Ltd., have received an order for "Efteelite" glassware (pattern G.260) for the internal offices of the new *Daily Express* building in Fleet Street.

For Sale

Messrs. T. C. & W. F. Keay are to sell by auction on March 8th and 9th linen weaving and finishing plant and machinery. (See our advertisement pages to-day.)

Trade Announcements

British Electric Meters, Ltd., have removed their head office to Morden Road, Mitcham, Surrey.

Messrs. Neville's (Liverpool), Ltd., have transferred their head offices and showrooms to 107-109, Gray's Inn Road, W.C.1. Mr. E. B. Allam has been appointed general manager.

Mr. A. A. Collie, A.M.I.E.E., 18, Wavertree Road, Streatham Hill, S.W.2, for 16 years associated with the Installation Department of the Relay Automatic Telephone Co., Ltd., is starting business on his own account and asks for manufacturers' catalogues and lists.

Messrs. Donovan & Co. have moved their head office, warehouse and trade counter to larger premises at 46 & 47, Gt. Charles Street, Birmingham.

Prices of Materials

The following prices are only general, and they may vary according to quantities and other circumstances:—

CHEMICALS, Etc.	Price Mar. 2nd.	Fortnight's Inc. or Dec.
[a] Acid, Oxalic .. .. per lb.	5½d.	—
[a] Ammoniac, Sal .. .. .. per ton	£80	—
[a] Ammonia, Muriate (large crystal) .. "	£52	—
[a] Borax .. .. "	£17	—
[a] Copper Sulphate .. .. .. "	£25 10s.	—
[a] Potash, Chlorate .. .. .. per lb.	3d. to 4d.	—
[a] " Perchlorate .. .. .. "	5½d.	—
[a] Shellac T.N. .. .. per cwt.	£3 15s.	10s. dec.
[a] Sulphur Commercial .. .. .. "	£11	—
[a] " Roll .. .. .. "	£11	—
[a] Soda, Chlorate .. .. per lb.	3d.	—
[a] " Crystals .. .. per ton	£5 to £5 5s.	—
[a] Sodium Bichromate, casks .. .. per lb.	4d.	—
METALS, Etc.		
[b] Aluminium, Ingots .. .. .. per ton	£95 to £100	—
[b] " Wire .. .. per lb.	1/1 to 1/9	—
[b] " Sheet and Foil .. .. .. "	1/1½ to 2/9	—
[b] Babbits Metal and Anti-friction Metals—		
Grade I .. .. .. per ton net	£131	£2 dec.
Grade II .. .. "	£94	£1 dec.
Grade III .. .. "	£54	£1 dec.
[c] Brass (rolled metal 2" to 12" basis) .. per lb.	7¼d.	¼d. dec.
[c] " Tubes (solid drawn) .. .. "	9½d. to 9¾d.	¼d. dec.
[c] " Wire, basis .. .. .. "	7¾d.	¼d. dec.
[c] Copper Tubes (solid drawn) .. .. "	10¼d.	¼d. dec.
[c] " Bars (best selected) .. .. per ton	£68	£4 dec.
[c] " Sheet .. .. "	£68	
[c] " Rod .. .. "	£68	
[d] " (Electrolytic) Bars .. .. "	nom.	—
[d] " " Sheets .. .. "	nom.	—
[d] " " Wire Rods .. "	nom.	—
[d] " " H.C. Wire .. per lb.	6½d.	¼d. dec.
[f] Ebonite Rod .. .. "	1/3 to 1/6	—
" Sheet .. .. "	1/3 to 1/6	—
[a] German Silver Wire .. .. .. "	2/2	—
[h] Gutta-percha, fine .. .. .. "	nom.	—
[h] India-rubber, Para fine .. .. "	3¾d.	—
[i] Iron, Pig (Cleveland No. 3) .. .. per ton	58/6	—
[i] " Wire, galve. No. 1, P.O. qual. "	£20	—
[g] Lead, English pig .. .. .. "	£14 5s.	£2 15s. dec.
[g] Mercury .. .. per bot.	£19	£1 inc.
[c] Mica (in original cases) small .. per lb.	6d. to 3/6	—
[c] " " medium .. "	4/- to 8/-	—
[c] " " large .. "	8/6 to 17/6 & up	—
[p] Phosphor Bronze, plain castings .. "	1/1½d.	—
[p] " " drawn bars & rods "	11½d.	¼d. dec.
[p] " " rolled strip & sheet "	11½d.	¼d. dec.
[p] " " wire .. .. "	1/0½d.	¼d. dec.
[o] Platinum .. .. per oz.	£11 1s.	3s. dec.
[d] Silicium Bronze Wire .. .. per lb.	7¼d.	¼d. dec.
[r] Steel, magnet, in bars .. .. "	7½d.	—
[g] Tin, Block (English) .. .. per ton	£139 5s. to £141 5s.	£2 dec.
[s] " Wire, Nos. 1 to 16 .. .. per lb.	8/1	—

Quotations supplied by:—

[a] G. Boor & Co.
[b] The British Aluminium Co., Ltd.
[c] Thos. Bolton & Sons, Ltd.
[d] Frederick Smith & Co.
[e] F. Wiggins & Sons.
[f] India-Rubber, Gutta-Percha and Telegraph Works Co., Ltd.
[g] James & Shakespeare.
[h] Edward Till & Co.
[i] Bolling & Lowe.
[j] Richard Johnson & Nephew, Ltd.
[m] P. Ormiston & Sons.
[o] Johnson, Matthey & Co.
[p] C. Clifford & Son, Ltd.
[r] W. F. Dennis & Co.

New Catalogues and Lists

Falk, Stadelmann & Co., Ltd., 83-93, Farringdon Road, E.C.1.—A catalogue (No. 657) of switch and fuse gear and a revised price list (No. 642) of lighting glassware. Also a leaflet describing a flex absorber for attachment to wood floor standards and a blotter relating to the Company's Illuminating Department.

Ferranti, Ltd., Hollinwood, Lancs.—Pamphlet No. W.513, dealing with the construction of amplifiers for use particularly with electrical gramophone pick-ups.

L. G. Hawkins & Co., Ltd., 30-33, Drury Lane, Kingsway, W.C.2.—The February issue of "The Link," containing particulars of the "Universal" mixer and juice extractors, washers and wringers, ironing machines, &c. Also an illustrated leaflet relating to the "Hera" electric washer.

Bakelite, Ltd., 68, Victoria Street, S.W.1.—The February number of "Bakelite Progress," showing some of the manifold uses of bakelite.

Metropolitan-Vickers Electrical Co., Ltd., Trafford Park, Manchester.—A large number of new and revised leaflets for insertion in the company's sectionalised catalogue.

Simplex Conduits, Ltd., Garrison Lane, Birmingham.—An illustrated folder dealing with watertight switches, plug and socket fittings, and switch-plugs.

Power Plant Co., Ltd., West Drayton, Middlesex.—A booklet of squared paper with a calendar for March.

Sterling Varnish Co., Fraser Road, Trafford Park, Manchester.—A catalogue of insulating varnishes and compounds.

B.E.N. Patents, Ltd., 92, Tottenham Court Road, W.1.—A catalogue of paint-spraying plant and particulars of some of the company's latest air compressor plants.

India-Rubber, Gutta-Percha & Telegraph Co., Ltd., Aldwych House, W.C.2.—A leaflet drawing attention to the company's latest innovation, the "Silvertown Length-Mark" cables, mentioned in our last issue.

General Electric Co., Ltd., Magnet House, Kingsway, W.C.2.—The "Osram Bulletin" for February, including articles on the lighting of art galleries, schools, cinemas, &c.

Brook Motors, Ltd., Empress Works, Huddersfield.—Catalogue No. 279, containing detailed particulars of motors for industrial drives.

Kersons Manufacturing Co., Ltd., Minworth, Birmingham.—Catalogue No. 105, illustrating and describing the company's extensive range of electrical accessories.

Barronia Metals, Ltd., Parsons Green Lane, S.W.6.—A 76-page illustrated catalogue of the company's products.

Standard Telephones & Cables, Ltd., Connaught House, Aldwych, W.C.2.—A folder relating to type 4,005 automatic telephone exchanges.

Bankruptcy Proceedings

T. W. Crawford, 25, Highbury Hill, N.—An application was made to Mr. Registrar Warmington at the London Bankruptcy Court on February 24th for an order of discharge on behalf of this debtor, who failed in August, 1925. The Senior Official Receiver reported that the provable claims amounted to £792, and the assets had realised only £3. The debtor attributed his failure and insolvency to lack of capital, heavy overhead expenses, inability through ill-health to give full attention to the business, and to mismanagement during his absence. The application was opposed by the Official Receiver on statutory grounds, including unjustifiable extravagance in living. His Honour upheld the Official Receiver's report and suspended the discharge for six weeks, consideration being given to the fact that the failure dated back to August, 1925.

B. Barnett, electrical engineer, 29, North Street, Barking, and elsewhere.—The statutory first meeting of creditors was held on Monday at London Bankruptcy Buildings. The debtor was also described as of 317, Roman Road, Bow (trading as the Maurice Engineering Co.), and he stated that a previous failure was recorded against him in December, 1921, from which proceedings he obtained a discharge that became effective in December, 1926. The failure is attributed to competition from cut-price traders and to insufficient working capital. The debtor returns liabilities of about £400 and in the absence of assets the estate was left in the hands of the Official Receiver.

W. Darbyshire, electrical factor and contractor, 65, Towngate, Leyland, Lancashire.—The public examination was held on February 26th at the Sessions House, Preston. According to the statement of affairs there were liabilities amounting to £498, and there was a deficiency of £25. The debtor attributed his failure to shortage of work, bad trade in the district, and losses on contracts.

Hilton Garrett & Co. (other than J. B. Garrett), dealers in electrical supplies, 122, Queen's Road, Brighton.—Receiving order made February 19th on debtors' own petition. First meeting, March 7th, at the Official Receiver's offices, 8, Old Steine, Brighton. Public examination, April 20th, at the Court House, Church Street, Brighton.

C. Woodhead (Woodhead Partners), electrical engineer, Angel Buildings, Angel Yard, Briggate, Leeds.—Receiving order made February 18th on debtor's own petition.

T. Taylor, electrician, 209a, Broad Street, Pendleton.—First meeting held March 1st at the Official Receiver's offices, Byrom Street, Manchester. Public examination March 16th at the Court House, Encombe Place, Salford.

T. P. Kelly, wireless dealer, 153, Brookmill Road, Deptford, S.E.—Trustee, Mr. F. T. Smith, 150, Southampton Row, W.C., appointed February 18th.

F. W. Hodges, electrical engineer, 9a, Station Hill, Kidderminster.—Last day for receiving proofs for dividend March 10th. Trustee, Mr. A. M. Fairbairn, 1, Priory Street, Dudley, Official Receiver.

E. M. Barker & H. D. Stillwell (Berk Electrical Co.), electrical and wireless engineers, 14, Cross Street, Reading.—First meeting, March 7th, at 8, The Forbury, Reading. Public examination, April 7th, at the Assize Courts, Reading.

H. Cavanagh, electrician, 19, Hampden Street, Salford, and at Prestwich.—First and final dividend of 6½d. in the £, payable March 7th at the Official Receiver's offices, Byrom Street, Manchester.

Company Liquidations

Wallage & Sons, Ltd., electrical and radio engineers, 15, Baker Street, Brighton.—The statutory meeting of creditors was held on February 22nd at the offices of Mr. A. E. Orbell, 6, Old Steine, Brighton. The statement of affairs showed ranking liabilities of £1,027 (all due to the trade) and total assets of £389. After allowing £31 for preferential claims, there remained a deficiency as regarded the creditors of £669. The issued capital of the company was £475, or a deficiency as regarded the shareholders of £1,144. Since its formation in February last year the company had traded at a loss of £710. Resolutions were passed confirming the voluntary liquidation of the company, with Mr. Orbell as liquidator, together with a committee consisting of the representatives of Messrs. Ellis & Mort, Ltd., the General Electric Co., Ltd., and Sussex Factors, Ltd. It was stated that efforts would be made to sell the business as a going concern.

Mersey Electrics, Ltd., 64, Brasenose Road, Bootle, Liverpool.—The statutory meeting of creditors was held recently at the Angel Hotel, Liverpool, when it was stated that the assets were estimated to realise £718, and they were subject to preferential claims of £129, leaving a balance of £589 to meet claims of debentures totalling £1,004. There was a deficiency with regard to debenture holders of £415, and there were no assets available for the unsecured creditors. The issued capital of the company was £3,300, all of which was fully paid, and with regard to shareholders there was a deficiency of £4,546. Resolutions were passed confirming the voluntary liquidation of the company, with Mr. A. Kent Jones, Wrexham, as liquidator. A committee was also appointed, consisting of the representatives of the General Electric Co., Ltd., the Liverpool Electric Cable Co., Ltd., and the Edison Swan Electric Co., Ltd.

London Switchplate Co., Ltd., 17, Tudor Place, London, W.C.1.—The statutory meeting of creditors was held on February 26th at the Institute of Chartered Accountants, London, when a statement of affairs prepared by Messrs. H. Newman & Co., 1-4, Warwick Street, W.1, was submitted, which showed trade liabilities of £387, and there were loan creditors for £656. The total assets amounted to £329, and there was a deficiency of £735. The share capital of the company was £1,550, so that there was a deficiency as regarded contributories of £2,285. One of the directors said that the present position of the company was due to adverse trading, and it had been impossible to recoup losses which had been incurred through bad debts and other causes. A resolution was passed confirming the voluntary liquidation of the company with Mr. H. Newman as liquidator.

Wood Electric Fittings Co., Ltd.—Winding up voluntarily. Liquidator, Mr. F. H. Agar, Pinners Hall, Austin Friars, E.C.

M-L Magneto Syndicate, Ltd.—Particulars of claims by March 24th to the liquidator, Mr. C. H. Smith, 84, Colmore Row, Birmingham.

City Electrical Appliances, Ltd.—Particulars of claims by March 31st to the liquidator, Mr. O. N. Holmes, 14, Corridor Chambers, Market Place, Leicester.

Park Wireless, Ltd.—Meetings, March 31st, at 115-117, Colmore Row, Birmingham, to receive an account of the winding-up of the company by the liquidator, Mr. C. J. Vane.

N.E.S. (Bradford), Ltd.—Meetings, March 31st, at 70, Kirkgate, Bradford, to receive an account of the winding-up by the liquidator, Mr. W. Hustwick.

Wye Lighting, Heating & Power Co., Ltd.—Meeting April 1st at 22, High Street, Whitstable, to receive an account of the winding-up by the liquidator, Mr. O. Ashby.

Meeting of Creditors

Essex Radio Supplies, Ltd., wholesale wireless dealers, Bishopsgate, E.C.—A meeting of creditors was held on February 24th at the Institute of Chartered Accountants, London. No statement of affairs was submitted, but Mr. H. Rainsbury, the company's auditor, reported that the liabilities amounted to about £41,000, all due to the trade, and there was an apparent deficiency of £17,000. Mr. Rainsbury added that there had been a heavy loss during recent months through the holding up of supplies, and it seemed to have been the policy of certain suppliers not to carry out their contracts with the company. During the course of the discussion it was stated that the company had commenced actions against certain suppliers, while a petition had been presented for the compulsory liquidation of the company, which had consented to the Official Receiver being appointed as the interim Receiver. It was decided that voluntary liquidation should take place with an independent liquidator and a committee.

Petitions for the winding-up of this company have been presented to the High Court by the Vee Cee Dry Cell Co. (1927), Ltd., and Tekade Radio & Electric, Ltd., and will be heard in London on March 7th.

Private Arrangement

Contal Radio, Ltd., radio manufacturers and merchants, 33, New Inn Yard, E.C.—A circular has been sent to creditors by the secretary of the company stating that the company's financial position has recently become one of great difficulty, and it cannot continue its business unless it can enter into some satisfactory arrangement with its creditors. A meeting of creditors was to be held at Winchester House on Wednesday to consider proposals for an arrangement.

Dissolutions of Partnership

Modern Radio Supplies, radio dealers, 71 & 77, Newington Butts, 129, Newington Causeway, and 23, Church Street, Camberwell, S.E.—Mr. A. Hyams and Mr. H. C. Baker have dissolved partnership. Mr. Baker will carry on the business.

Mansell Jarrett Co., electrical engineers, 67a, Holland Street, Blackfriars, S.E.—Messrs. G. B. Mansell and R. F. Jarrett have dissolved partnership. Mr. Jarrett will attend to debts.

Winding-up Petition

Agricultural and General Engineers, Ltd.—In the Chancery Division on February 29th, Mr. Justice Bennett granted an adjournment of the petition of Foster Turner, Ltd., for the compulsory winding-up of this company.

Electricity Supply

Lighting, Domestic, Power

Barking.—EXTENSIONS.—The Electricity Committee is to extend feeders in the Longbridge district at a cost of £6,782, and a proposal by the Fixed Price Light Co., Ltd., to extend operations in further districts is being considered.

Bradford.—ELECTRICITY CHARGES TO TRAMWAYS.—The Electricity Committee recommends a reduction in charges for electricity to the Tramways Department representing a saving of approximately £11,500 per annum to the tramways. The Electricity Committee finds it possible to make this reduction to its largest consumer owing to increased efficiency of working at Valley Road generating station in consequence of new plant which has been put into use during the past twelve months, and also by reason of its steadily increasing revenue generally.

Canada.—THE BEAUHARNOIS POWER SCHEME.—An Order-in-Council has been issued bringing into force the legislation passed during the last Session of Parliament respecting the Beauharnois Power Co., which has now nearly completed the construction of plant of 500,000 h.p. on the St. Lawrence River, near Montreal. The Order provides that the Government shall take over the canal scheme as a link in the proposed deepened waterway system of the St. Lawrence and that any further rights given to the company for the additional diversion of the water must be only with the consent of Parliament and not through the Governor-in-Council.—*Reuter* (Ottawa).

Caterham and Woldingham.—PURCHASE OF UNDERTAKINGS.—The London and Home Counties Joint Electricity Authority has decided to enter into an agreement for the purchase of the Caterham and Woldingham undertakings of the Urban Electric Supply Co., Ltd., for £172,250.

Continental.—POLAND.—According to *The Times*, a boycott of electricity has been started in several Polish towns as a protest against the increase in its price since the imposition of the 10 per cent. tax at the beginning of the year.

GERMANY.—A boycott of electric lighting is threatened in Berlin if the electricity charges and entertainment taxes are not reduced.

Darlington.—PROPOSED PRICE REDUCTIONS.—A reduction of 10 per cent. in the charges for electricity in the current quarter is recommended by the Gas and Electricity Committee.

Exeter.—LOANS.—The Electricity Committee is to apply for sanction to loans of £5,000 for cookers and £5,000 for wiring installations.

Hornsey.—NEW FEEDERS AND PLANT.—New feeders, &c., are to be provided at the Muswell Hill and Oakfield Road sub-stations at a cost of £6,000. At the Oakfield Road sub-station new plant is also to be installed at a cost of £3,000.

Ilford.—EXTENSIONS.—The Electricity Committee is to carry out the following extensions:—Additional e.h.p. feeder from Ley Street to Gants Hill (£2,000); additional 500-kW rectifier unit at Clark's Road sub-station (£3,500); sub-station near the centre of the town (£2,000); a 1,000-kW rectifier, etc. (£5,250); a 500-kW rotary convertor at the dust destructor (£3,000); and a 300-kW transformer kiosk on the Gearies Estate (£500).

MAINS AND SERVICES.—Sanction has been received to a loan of £25,000 for mains and services.

Japan.—POWER STATION EXTENSIONS.—The Kinu-gawa Hydro-Electric Co. has applied for permission to extend its Sumida power station from 21,000 to 36,000 kW.

NEW SUB-STATIONS.—The construction of three sub-stations, each of 100,000-kVA capacity, at Iwakura, Sakura and Kizu, is proposed by the Toho Power Co.

Kettering.—SUPPLY EXTENSIONS.—The Electricity Committee has obtained sanction to the borrowing of £1,080 in connection with the supply to the parishes of Stoke Albany, Wilbarston, Middleton and Cottingham.

Lancaster.—SUPPLY TO MILLS.—Negotiations have been completed with Messrs. James Williamson & Son, Ltd., to provide electricity at all their four mills—Bath, Greenfield, St. George's, and Lune. To give these supplies it will be necessary for the Electricity Committee to obtain a grid supply and application has been made for sanction to a loan of £26,500 for cable and switchgear equipment. In connection with the grid supply new switchgear will have to be installed in certain sub-stations at an estimated cost of £5,000.

Liverpool.—ADMINISTRATION.—The City Council is considering a recommendation to constitute an Electric Power and Lighting Committee by separating that body from the existing Tramways, Electric Power and Lighting Committee.

Lleyn (Carn).—ELECTRIFICATION OF THE PENINSULA.—The *Manchester Guardian* states that, in view of obstacles and the prohibitive price asked by the North Wales Power Co., Ltd., for electrifying villages in the Lleyn Peninsula, the Rural District Council has decided to appeal to the Government to grant facilities to owners of several disused watermills to convert them into a generating station for electrifying the peninsula.

London.—POPLAR.—The General Purposes Committee is to renew the electrical installation at the Town Hall at a cost of about £200.

The Electricity Committee is to improve the lighting of

East India Dock Road at a cost of £815, and lay a feeder costing £2,276 to enable the illumination in the vicinity of the dock approaches to be improved.

BATTERSEA.—Electricity is to be given to St. John's College housing estate at a cost of £3,325, and services are to be provided at 166 premises at a cost of £1,628. A d.c. feeder costing £367 is also to be laid.

Netherton Colliery (Northumberland).—SUPPLY FOR VILLAGE.—Work has commenced on the laying of the cable from Netherton Colliery to Stannington Sanatorium which will provide a supply of electricity for Netherton village.

New Zealand.—CHRISTCHURCH.—The electrical engineer, Mr. J. C. Forsyth, in his report for the year 1930-31 states that the total revenue of the electricity undertaking was £257,297, the working expenditure amounting to £57,064. Sales of electricity totalled only 46,250,000 kWh, as compared with 47,500,000 kWh in 1929-30, but the maximum load rose from 13,340 to 15,145 kW. Consumers connected increased from 30,693 to 31,714.

Northern Ireland.—ELECTRICITY BOARD'S CHARGES.—The Electricity Board for Northern Ireland has just published a booklet covering the scale of charges and the general conditions of supply in the districts served.

BALLYMENA.—At a special meeting held last week the Urban District Council decided to continue negotiations for the transfer of the electricity undertaking to the Antrim Electricity Supply Co., Ltd.

Nuneaton.—MAINS AND SERVICES.—The Electricity Committee is to apply for permission to borrow £10,000 for prospective expenditure on mains and services during the next three years.

Plymouth.—CABLE EXTENSIONS.—The Electricity Committee has approved cable extensions in thirteen streets of the city.

PROGRESS OF THE GRID.—The last of the 160 transmission line towers in the Newton Abbot to Plymouth section of the grid system was recently erected on the east bank of the River Plym, near Laira Bridge, Plymouth.

Portland.—EXTENSIONS.—The Urban District Council has received sanction to a loan of £872 for extending overhead lines from Moorfield. A supply of electricity is to be given to Weston and Southwell.

Preston.—LOANS SANCTIONED.—The Town Council has received sanction to loans totalling £148,000 for mains, services, plant, and meters.

Reigate.—SUB-STATION EQUIPMENT.—The Town Council has received sanction to a loan of £2,971 for sub-station equipment.

Ross-on-Wye.—SPECIAL ORDER.—The Ross Electric Light and Power Co. has applied to the Electricity Commissioners for a Special Order authorising it to extend its supply area so as to include the portion of the parish of Ross Rural which was transferred to the Ross Urban district by the County of Hereford (Ross Extension) Confirmation Order, 1905.

Sheffield.—MAINS EXTENSIONS.—The Electricity Committee is to extend mains at a cost of £3,597.

Shipley.—LOANS SANCTIONED.—The Electricity Committee has received sanction to loans of £6,945 and £2,236 for mains extensions and sub-stations.

South Shields.—STREET LIGHTING.—The Electricity Committee has instructed the electrical engineer to prepare estimates of the cost of electrically lighting the streets of the town which are now illuminated by gas.

Stanhope (Co. Durham).—LOAN.—The Parish Council is to borrow £1,400 for the provision of electric street lighting.

Staplehurst (Kent).—STREET LIGHTING DECISION.—The Parish Council has decided to adopt electricity for street lighting at a cost of £3 per lamp per annum. Energy will be provided by the Weald Electricity Supply Co., Ltd.

Stoke-on-Trent.—MAINS EXTENSION.—As Messrs. Alfred Meakin (Tunstall), Ltd., propose to install an electric kiln at their Royal Albert Pottery, High Street, Tunstall, the Corporation Electricity Committee has decided to lay a l.p. three-phase main at a cost of £300.

COMING-OF-AGE.—A commemoration of the 21st anniversary of the installation of the three-phase system will take place on March 10th.

Warrington.—MAINS AND SERVICES.—The Electricity Committee is to apply for sanction to a loan of £20,000 for mains and services.

Weymouth.—A SUPPLY FOR CHICKERELL AND CHARLESTOWN.—The Town Council has now completed a scheme costing £7,000 for providing electricity to the parishes of Chickerell and Charlestown and the supply was recently switched on by the Mayor, Capt. F. W. Hamblin. There are over 100 consumers, and provision is made for supplying new Council houses at Westham.

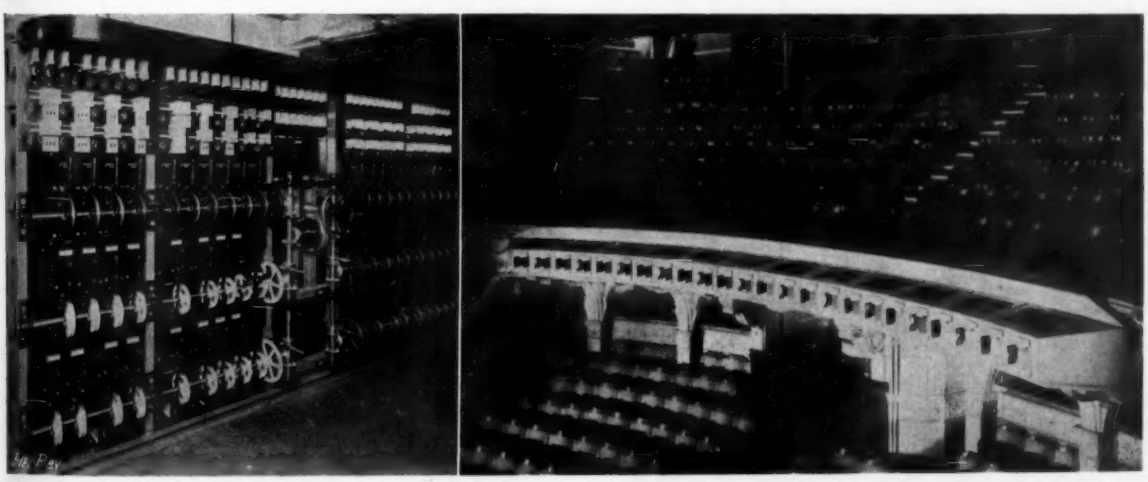
Wood Green.—PROPOSED TRANSFER OF UNDERTAKING.—At a meeting of the Wood Green Council last week it was decided that, subject to the approval of the Electricity Commissioners, the local supply of electricity (now in the hands of the Tottenham and District Gas Co.) should be transferred to the North Metropolitan Electric Power Supply Co.

Wrexham.—CABLE EXTENSIONS.—The Town Council has applied for sanction to a loan of £10,000 for mains and services.

Traction

Burnley.—TRANSPORT AMALGAMATION SCHEME.—The Corporation has approved the principle of the unification of municipal tram and bus undertakings at Burnley, Nelson, and Colne. It is proposed that the three undertakings should be amalgamated under a joint committee representative of the three authorities and that the central depôt at Burnley should be utilised as chief works and administrative offices. Expert advisers suggest immediate steps to ensure that the existing tramways should be gradually superseded by buses.

Derby.—TRAMWAY ABANDONMENT.—The Corporation has made application to the Minister of Transport for an Order authorising the abandonment of the tramways on the Baddington Lane-Malthouse Lane and the Wardwick-Curzon Street-Uttoxeter Road routes. Trolley-bus services are to be substituted.



Two recent contracts carried out by the Strand Electric Co.: Left.—Switchboard for the Shakespeare Memorial Theatre, Stratford-on-Avon. Right.—Stage-lighting equipment at the London Hippodrome.

Great Western Railway.—ELECTRIFICATION POLICY.—Referring to the subject of railway electrification at the annual general meeting of the Great Western Railway Company on February 24th, Viscount Churchill, chairman, said that although the Weir Committee made no recommendation, it was quite clear from its report that the heavy expenditure involved could not be justified on commercial grounds, and the company had no intention of embarking upon a project which at best could only be regarded as a highly speculative venture. The question of electrifying particular sections of the company's line had been investigated on more than one occasion during recent years, but in all cases the probable financial return was considered inadequate to justify the capital expenditure involved. There was no doubt that the electrification of suburban lines where there was a dense traffic was attractive, but until the position with regard to road competition became more stabilised, it was not possible to forecast the probable results of any electrification scheme.

Irish Free State.—THE DRUMM BATTERY.—The Drumm battery train is now operating on a three-journey daily service between Dublin and Bray.

Kettering.—TRAFFIC SIGNALS.—The Urban District Council is to obtain estimates for the provision of automatic traffic signals.

Leeds.—TRAM BRAKE CONVERSION.—The Tramways Committee is to carry out air brake conversions on fifty tramcars at a cost of £1,600.

Manchester.—BUSES TO REPLACE TRAMS.—The Transport Committee has decided to substitute buses for trams on the route between Manchester Road and Guide Bridge. It is proposed to apply in the next Corporation Parliamentary Bill for full powers to operate trolley-buses in the city.

Newcastle-on-Tyne.—REGULAR DIESEL-ELECTRIC SERVICE INAUGURATED.—The first of the Diesel-electric trains constructed by Sir W. G. Armstrong-Whitworth & Co., Ltd., was put into regular operation on the London & North-Eastern Railway Co.'s system at Newcastle-on-Tyne on Monday last. The rail-coach, which has been named the "Tyneside Venturer," is of 250 b.h.p., and carries 150 passengers at a speed of 65 m.p.h. The running costs will be about one penny per mile, which is less than half that of the steam train services.

Southern Railway.—ELECTRIFICATION PROGRESS.—Speaking at the annual general meeting of the Southern Railway Company on Monday, Mr. G. W. E. Loder (deputy chairman) said that the electrification of the main line to Brighton and Worthing was proceeding according to programme, and they expected to commence working to Reigate and Three Bridges in July and to Brighton and Worthing early next year. Under this scheme the service to Brighton and Worthing would be much improved and, in addition to a number of semi-fast trains, they intended to run an hourly service of non-stop express trains performing the journey in each direction between London and Brighton in 60 minutes.

South Shields.—REBUILDING OF TRAMCARS.—The Corporation has purchased six tramcars from the Wigan Town Council and is having them rebuilt under the direction of Mr. J. Austin Baker, the transport manager.

Tynemouth.—TRAFFIC SIGNALS.—The Ministry of Transport has given sanction to the Town Council to erect automatic traffic signals in various parts of the town.

Windsor.—TRAFFIC SIGNALS.—Berks C.C. is to install automatic traffic signals at cross roads at a cost of £190.

Communications

Birmingham.—TELEPHONE PROGRESS.—The annual report of the local T. and T. Advisory Committee shows that in the Birmingham area of the North Wales district (superintending engineer: Mr. R. A. Weaver) during 1931 four new exchanges were opened, making the total 92. During the year automatic working was introduced in the area; ultimately there will be 40 automatic exchanges, of which nine will be new ones, with 150,000 subscribers' lines. This year eleven exchanges are to be converted and four new ones provided. The conversion of the Wolverhampton group is proceeding separately.

The number of telephones in use increased by 3,160 net to 81,382, the number of private branch exchanges being now 3,945 with 30,491 telephones. Residence rate subscribers grew by 1,217 to 17,526. There are 689 kiosks in use and a total of 1,061 call offices. Local calls originated increased by 948,718 to 61,151,803 and the number of trunks rose by 112,107 to 4,549,538. Phonograms increased by 12,320 to 906,670.

NORTH WALES.—In the Chester, North Wales, and Hanley district the net increase of telephones was 2,332 to a total of 45,124. The area is served by 362 exchanges, an increase of 22, of which 287 are manual and 75 automatic; the advantages of the latter type in rural districts have been much appreciated and 28 of them were completed during the year. Kiosks increased by 84 to 308. Effective trunk calls increased by 5.5 per cent. to 4,315,009, phonograms decreased slightly to 301,348, and local and junction calls grew by 6 per cent. to 20,107,167.

Hungary.—A TUNGSRAM PROGRAMME.—We are asked to announce that the Hungarian Tungsram organisation is sponsoring a concert of music on March 10th between 7 and 8.30 p.m. G.m.t. The programme will consist of classical and modern Hungarian music and it will be broadcast by the Budapest station (wavelength 550 m.) and relayed from Belgrade (430.4 m.), Vienna (517 m.), Zagreb (317 m.), Ljubljana (574.7 m.), and other stations.

Sandwich Islands.—RADIO-TELEPHONY.—The Postmaster-General announced on March 1st that the transatlantic radio-telephone service had been extended from all parts of Great Britain and Northern Ireland to the islands of Oahu, Hawaii, Kauai, and Maui, communication being available daily between 6.30 p.m. and 2.30 a.m. British time.

The Late Mr. H. D. Wilkinson

WE regret to record the death on February 24th at his residence at Streatham Common, at the age of 75 years, of Mr. Henry Daniel Wilkinson, M.I.E.E., M.I.Mech.E., who had been engaged in consulting and inspecting engineering practice for very many years. Mr. Wilkinson received his training with the Eastern Telegraph Co., and Davey Paxman & Co., and in the course of his lengthy career he held many appointments with submarine cable companies and other large concerns; also Government exhibition authorities. He acted as an expert in cable litigation, was a lecturer on electrical subjects, was consulting electrical engineer to Birmingham University, to theatres, quarries and country house owners, and he was also employed here as an inspecting engineer on behalf of many South African municipalities. He was the author of a number of well-known books, among them being "Submarine Cable-laying and Repairing" and "Electric Lifts." He was well known in the submarine cable world. The funeral took place on Monday last at Streatham Park Cemetery.

We publish an intimate personal appreciation from the pen of an intimate friend possessing the very familiar initials, "F. B":—

I first met H. D. W. in 1884 when I was a student at the Hanover Square School of Telegraphy and Electrical Engineering. He was the senior tutor; among the others were E. C. Rimington and Desmond Fitzgerald. Worby Beamont was a visiting tutor and lecturer on gas engines, etc. H. D. W., a fine upstanding young Englishman, well over 6 feet, had gone through the Eastern Telegraph Co.'s training school and had a wide experience in submarine telegraphy both on foreign cable stations and on cable-laying and repairing ships, and what he did not know of the practical side of his subject did not greatly matter. As a lecturer he was very unconventional. Seated carelessly on the corner of a table within reach of the blackboard, he would racily relate his experiences either in some far-distant cable station or on board a cable ship, and in this way impart information which left a much more lasting impression than did many a more formal lecture.

After leaving the school I did not see him until 1902 when, on returning to London, I ran across him in a restaurant in the City. He had not changed much and I recognised him at once, whilst I had grown from a beardless youth into a dark-bearded man. I reintroduced myself—we talked of the old school and what we had done in the meantime. He, although when I had last seen him was approaching the age of 30, had realised that telegraphy was only the beginning of electrical engineering and that the electrical engineer of the future must be a mechanical engineer also. He, therefore, started again by serving his time with Davey Paxman & Co., of Colchester, supporting himself partly by technical journalism. He was one of the few engineers who wielded a facile pen. Afterwards he joined Willans & Robinson at Rugby, acting as superintending engineer visiting central stations all over the country wherever any trouble was reported, and putting it right. Overhearing a member of the office staff reply on the telephone to a central station engineer who was making some complaint, "we will send our traveller to see you," he was so annoyed at being called a "traveller" that he sent in his resignation.

Later, about 1900, he was asked by the Eastern Telegraph Company to go to Cape Town to investigate the cause of the disturbance to their cable system since the inauguration of the electric tramways. The trouble was such that it was practically impossible to transmit messages during the daytime. H. D. W. found that the trouble was due to leakage currents through the earth. He plotted contour lines of leakage and decided that, in order to get rid of the disturbance, it would be necessary for the cable company to lay a return cable three miles out to sea and earth it there. This was eventually done, and the cable companies failed in their action for damages against the tramway authorities. They had no more vested rights in the earth in Cape Town than had the Post Office in Leeds when they brought their action against the Leeds tramway authorities for causing telephone disturbance. The remedy was the same, copper returns.

Whilst in Cape Town the Boer War broke out and H. D. W. joined the Civic Guard. When I met him in the restaurant in 1902 he had just returned from South Africa. I asked what he was doing and he replied, "I am going to start consulting work and am looking for an office." "So am I," I replied, "let's join forces!" And so began a very happy association which lasted till 1915, when the war, which broke up so many things, broke up that also. During the time we shared offices he did a lot of work for the submarine cable companies, and among other things went to Sierra Leone to supervise the erection of some plant at the cable station. There he had an attack of black-water fever—some time after his return he was operated upon for intestinal trouble.

In 1923 he was again in hospital undergoing a serious operation. His strong constitution was proof against all these troubles and he continued his consulting practice in Victoria Street to within a few weeks of his death. He had a remarkably cheerful disposition, and was an excellent raconteur and the infection of his hearty laugh made him in great demand for social gatherings. The scrupulousness with which he examined every detail of an installation under his supervision was often very trying but the contractor could rest assured that when "H. D." had passed the job there was not much the matter with it, and there are many who will remember him gratefully for having insisted on the maintenance of a high standard of work whether it was seen or hidden.—F. B.

Contract Information

When "Contracts Open" are advertised in our "Official Notice" pages the date of the "Electrical Review" containing the advertisement is given in parentheses below

Contracts Open

Australia.—MELBOURNE.—April 11th. City Council. Lift motors and control gear. (A.X. 11273.)*

Aylesbury.—March 14th. Electricity Department. General stores. (February 26th.)

Barnes.—March 8th. Urban District Council. 1,500-kW rotary convertor, transformer and starting switchgear. (February 19th.)

Bristol.—March 10th. Electricity Department. Meters. (February 19th.)

Cheadle and Gatley.—March 8th. Urban District Council. 200-kVA transformer switch and distribution kiosk. (February 19th.)

Cleethorpes.—March 7th. Urban District Council. Cables and meters. (February 26th.)

Doncaster.—March 7th. West Riding Public Health and Housing Committee. Electric wiring at Tuberculosis Dispensary. County architect, County Hall, Wakefield.

Dover.—March 7th. Harbour Board. Electric cables and sundries for a year. Mr. Rutley Mowll, registrar, Castle Street (2s. 6d. each for schedules).

Edinburgh.—March 11th. Corporation. Installation of electric lighting and power in houses and shops. Specifications, &c., from the Engineer's Office, Dewar Place (deposit £1 1s.).

Erith.—March 18th. Electricity Department. H.p. and l.p. switchgear and other apparatus for sub-station equipment. (February 26th.)

Ilford.—March 10th. Ilford and Barking Joint Sewerage Committee. Transformers, switchgear, &c., for new pumping station. (February 19th.)

March 17th. Electricity Department. Rotary convertor and rectifier plant. (See this issue.)

India.—NEW DELHI.—March 31st. India Store Department. Rubber-covered cables. (A.X. 11286.)*

April 7th. Lead-covered cables. (A.X. 11285.)*

Lanarkshire.—County Council. Electric lighting installation in 20 houses at Shettleston. Mr. P. C. Smith, Housing and Town Planning Department, Hamilton.

London.—March 8th. India Store Department. 33,000-V substation equipment. Director-General, Belvedere Road, S.E.1 (fee 5s.).

March 15th. County of London Electric Supply Co., Ltd. Cables and accessories for Barking power station extensions.

OFFICE OF WORKS.—March 17th. Electrical and mechanical labour in Birmingham (mechanical only), Bristol and Liverpool districts. (See this issue.)

March 11th.—India Store Department. Auto searchlight lamps. (See this issue.)

BETHNAL GREEN.—March 21st. Borough Council. Electric lighting installation work at a block of tenement buildings. (See this issue.)

Manchester.—March 19th. Electricity Committee. Voltage variation equipment. (See this issue.)

New Zealand.—WELLINGTON.—June 2nd. Government Railways. Butt and arc welding sets. (A.X. 11279.)*

June 2nd. Electrically-operated 15-ton overhead travelling crane. (A.X. 11281.)*

Norfolk.—March 18th. Public Health and Assistance Committee. Electrical installation at Downham Market Poor Law Institution. Mr. C. J. Norton, architect, Stracey Road, Norwich.

Nottingham.—March 10th. City Council. Electric lighting installation at the Basford Works and Ways Depôt. Mr. T. Wallis Gordon, city engineer and surveyor, Guildhall (deposit £1).

Rhondda.—March 26th. Urban District Council. Meters, copper wire and house service material. (February 19th.)

Smethwick.—Education Committee. Electric lighting installation at Abbey Road School. Messrs. Henry Lea & Son, 151-3, Edmund Street, Birmingham (deposit £3 3s.).

South Africa.—JOHANNESBURG.—March 19th. City Council. Tram track materials. (G.X. 11161.)* Sewage equipment. (G.X. 11182.)*

CAPETOWN.—April 6th. Electricity Department. L.p. ironclad switchgear. (A.X. 11274.)*

Stoke-on-Trent.—March 9th. Electricity Department. A.c. meters, mains and cables, static transformers and switchgear. (See this issue.)

Sutton and Cheam.—March 7th. Urban District Council. Rewiring and reconditioning of electrical installation at Public Hall, Sutton. Mr. W. Hedley Grieves, Council's surveyor, Municipal Offices, Sutton (deposit £1 1s.).

Turton.—March 15th. Urban District Council. Cable, meters, joint boxes, ironclad fuses and sealing chambers. Electrical superintendent, Council Offices, Bromley Cross, near Bolton.

Walthamstow.—March 23rd. Electricity Department. Cables. (See this issue.)

West Riding.—March 7th. Mental Hospitals Board. Six months' supply of electric lamps to mental hospitals at Menston, Storthes Hill, and Wadsley Bridge. Mental Hospitals Board's office, Wakefield.

Worsley.—March 11. Urban District Council. Electric lamps for year ending March 31st, 1933. Mr. J. Howard, U.D.C. surveyor, Town Hall, Walkden.

* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Contracts Closed

Accrington.—Watch Committee. Accepted. Traffic signals.—Forest City Electric Co., Ltd. (£40); Revo Electric Co., Ltd. (£104).

Blackburn.—Poor Law Institution Committee. Accepted. Installation of a G.E.C. all-mains set with ten loudspeakers in the Institution.—W. J. Furse & Co.

Durham.—County Council. Accepted. Electric lighting installation at Lanchester Institution (£615).—Alfred White Electrical Co.

Education Committee. Accepted. Electric lighting installations, New Silksworth school (£204).—F. Reid, Ferens & Co.; Crook school (£265), Howden school (£95), and Helmington school (£145).—R. Robson.

East Wemyss.—Town Council. Accepted. Electric wiring at the new housing scheme at Roslin.—J. D. Beveridge.

Exeter.—Watch Committee. Accepted. Traffic signals (£62).—Forest City Electric Co., Ltd.

Gillingham (KENT).—Town Council. Accepted. Low temperature electric heating panels for the new school at Rainham (£1,287).—Barker, Young & Co.

Hull.—Telephones Committee. Accepted. Switchboards (£100) and 400 table telephones (£1,033).—Automatic Electric Co., Ltd. Cable (£71).—W. T. Henley's Telegraph Works Co.

Liverpool.—Port Sanitary and Hospitals Committee. Recommended. Electrical sterilisers for various hospitals.—G. P. Dennis, Ltd.

Manchester.—Housing Committee. Accepted. Electrical installations in houses on Withington and Wythenshawe estates.—R. H. Clampnett & Co. Electrical installations in houses on Heaton Park and Victoria estates.—Hall & Stinson, Ltd.

Electricity Committee. Accepted. 6,600-V switchgear at Dickinson Street and Stuart Street sub-stations; supervisory control gear Queen's Park station.—Ferguson, Pailin, Ltd. Neutral earthing equipment Queens Park sub-station.—Erskine, Heap & Co., Ltd. Electric cooking ranges for 12 months.—Revo Electric Co., Ltd.; Jackson Electric Stove Co., Ltd.; Credenda Conduits Co., Ltd.

Milton (HANTS).—Urban District Council. Accepted. Electrical pumping plant at Ashley (£130).—Adams-Hydraulics, Ltd.

Shipley.—Electricity Committee. Accepted. H.p. cable for 12 months.—Standard Telephones and Cables. L.p. cable for 12 months.—Pirelli-General Cable Works.

Forthcoming Events

Royal Institution.—Friday, March 4th. Institution. 9 p.m. "Michael Faraday and Electro-Chemistry." Sir Harold Hartley. Saturday, March 12th. 3 p.m. "The Electron." Lord Rutherford.

Physical Society.—Friday, March 4th. Imperial College of Science, S.W. 5 p.m. Short papers.

Institute of Marine Engineers.—Tuesday, March 8th. Institute, Minories, E.C. 6 p.m. "Pulverised Fuel Firing with special reference to Power Station Practice." Mr. S. B. Jackson.

Electrical Power Engineers' Association.—Tuesday, March 8th. Junior Institution of Engineers, London. "Mechanical Appliances for Excavation Work, &c." Mr. D. Y. Marshall.

Institution of Engineers-in-Charge.—Wednesday, March 9th. St. Bride Institute, E.C. 7.30 p.m. "The Development of the Thermionic Valve." Mr. F. E. Henderson.

Edinburgh Electrical Society.—Wednesday, March 9th. Y.M.C.A., South St. Andrew Street, Edinburgh. 8 p.m. "Electrical Heating Apparatus." Mr. A. Young.

Institute of Metals.—March 9th and 10th. Institution of Mechanical Engineers. Annual general meeting. March 9th. Trocadero Restaurant, W. 7 p.m. Annual dinner and dance.

Institution of Welding Engineers.—Thursday, March 10th. Institution of Mechanical Engineers, London. "High Speed Arc Welding." Mr. J. H. Paterson.

Institution of Electrical Engineers.—Thursday, March 10th. Institution, London. 6 p.m. "Modern Boiler Plant." Mr. J. Bruce. (*Meter and Instrument Section*).—Friday, March 4th. Institution, London. 7 p.m. "The Metering of E.H.P. Supplies on the Secondary Side of Step Down Transformers." Mr. S. H. C. Marton. (*London Students' Section*).—Saturday, March 5th. 3 p.m. Visit to Charrington's Brewery, Mile End Road, E. Friday, March 11th. Institution, London. 6.15 p.m. "The Bypath Automatic Telephone System." Messrs. J. W. Moffatt and K. B. Baldwin. (*North Midland Students' Section*).—Saturday, March 5th. 2.15 p.m. Visit to the Thorpe Stapleton sewerage works of Leeds Corporation. (*Mersey and North Wales (Liverpool) Centre*).—Monday, March 7th. The University, Liverpool. 7 p.m. "Modern Boiler Plant." Mr. J. Bruce. (*North Midland Students' Section*).—Monday, March 7th. 7.15 p.m. Visit to the Yorkshire Pure Ice and Cold Storage Co. (*North-Western Centre*).—Tuesday, March 8th. Engineers' Club, Manchester. 7 p.m. "Radio Engineering." Col. A. S. Angwin. (*North-Eastern Centre*).—Tuesday, March 8th. Literary and Philosophical Society, Newcastle-upon-Tyne. Faraday lecture. "Everyday Uses of Electricity." Prof. J. K. Catterson-Smith. (*Scottish Centre*).—Tuesday, March 8th. Institution of Engineers and Shipbuilders in Scotland, Glasgow. 7.30 p.m. "Recent Developments at Yoker Power Station." Mr. N. C. Bridge. (*Hampshire Sub-Centre*).—Wednesday, March 9th. University College, Southampton. 7.30 p.m. Short papers. (*Tees-side Sub-Centre*).—Wednesday, March 9th. Cleveland Technical Institute, Middlesbrough. 7 p.m. "Faults and their Clearance on Large Networks." Messrs. R. O. Kapp and

C. G. Carruthers. (*North-Western Students' Section*).—Tuesday, March 8th. Engineers' Club, Manchester. 7.30 p.m. Smoking concert. (*Dundee Sub-Centre*).—Thursday, March 10th. University College, Dundee. 7.30 p.m. "Metal Clad Switchgear, Automatic Protection, and Remote Control." Mr. H. W. Clothier. (*North Midland Centre*).—Friday, March 11th. Hotel Metropole, Leeds. 7 for 7.30 p.m. Annual dinner. (*North-Eastern Students' Section*).—Friday, March 11th. Armstrong College, Newcastle-upon-Tyne. 7.15 p.m. "A.C. Commutator Motors." Mr. C. T. Webster.

Birmingham Electric Club.—Friday, March 11. Grand Hotel, Birmingham. 7 p.m. Annual dinner.

Electrical Association for Women.—Saturday, March 12th. 10.30 a.m. Visit to showrooms of Messrs. Falk, Stadelmann & Co., Ltd., Farringdon Road, E.C.

Association of Mining Electrical Engineers.—Saturday, March 12th. South Wales Institute of Engineers. 6 p.m. "Vulcanisation of Trailing Cables."

Belfast Association of Engineers.—Saturday, March 12th. Belfast. Annual dinner.

Notes

The Illuminating Engineering Society

The Illuminating Engineering Society is carrying into effect its desire to arouse interest in illumination in other parts of England besides London by arranging two special meetings in Birmingham and Manchester. At the meeting in Manchester which is to take place in the Reynolds Hall of the Manchester College of Technology, on March 10th, at 6.30 p.m., Mr. C. C. Paterson, O.B.E., will deliver an address on the International Illumination Congress. At a meeting to be held at the Chamber of Commerce, New Street, Birmingham, on March 14th, at 5 p.m., there will be two addresses, one by Mr. D. Spencer-Johns on "The Importance of Good Lighting in Commerce and Industry," and the other by Mr. P. E. Shopland on "Some Observations on Lighting in Factories."

In both cities there already exists a nucleus of members of the Illuminating Engineering Society, so that it should not be very long before the aim of the Society of establishing local centres in the North-Western and Midland areas is realised.

I.E.E. Students' Dinner

There was a welcome increase in the attendance at the 25th annual dinner of the I.E.E. London Students' Section, which was held at the Florence Restaurant, Rupert Street, on February 25th.

Mr. J. H. Marsh, proposing the toast of "The Institution," suggested that the students might do a little more for the Institution; their annual subscripion was 31s., but they cost the Institution 58s.

Capt. J. M. Donaldson (president I.E.E.) commented on the splendid work of Mr. Crawter in selecting student members from the many applicants who aspired to belong to the Institution.

Mr. F. Jervis-Smith then proposed the health of "The Guests," referring to the help of many of those present, including the president, Mr. F. Crawter, Mr. Rowell, Mr. Reyner (editor of the Students' *Journal*), Mr. Tree, and the technical Press. Mr. C. G. Dahl (London Students, I.Mech.E.) responded.

Mr. Crawter proposed the "Students' Section," and made a significant reference to the need for students to pay more attention to the commercial side of electrical engineering. The responder was Mr. G. J. Shaw (chairman), who said he would like to see more co-operation between the students' sections of the Institutions of Electrical, Mechanical and Civil Engineers, and expressed a personal desire for an amalgamation.

In between the speeches a varied programme of entertainment was given by Messrs. G. Shaw, H. Milton, F. Corthesey and E. J. Loveridge.

British Standard Dimensions of Black Bolts, Etc.

B.S. Specification No. 28, 1932, Black Bolts and Nuts, Studs, Lock Nuts and Washers, has been issued by the British Standards Institution. The Specification provides for bolts of diameters from ¼ in. up to 6 in., and gives the dimensions for the heads, locknuts and washers, and the length of the screwed part. Tolerances on the width across flats and on the thickness of the heads and nuts are also given.

As the dimensions previously given for black bolts and nuts are still referred to in the trade as the dimensions of B.S. Specification No. 28, the new specification has been issued under this number although it originally also provided for bright bolts and nuts and spanners (now B.S.S. 190 and 192). Copies of the revised specification may be obtained from the Publications Department, British Standards Institution, 28, Victoria Street, S.W.1, price 2s. 2d., post free.

E.P.E.A. London Technical Group

When Mr. W. F. Andrews set out to organise the first annual dinner and dance of the London Technical Group of the E.P.E.A., we recollect that he announced his ambition of making it one of the leading events of the electrical social season. All who have taken part in these functions will agree that this ambition has been fully realised, and in view of the well-known "E.P.E.A. atmosphere" they have been most happy affairs. The fourth of the series which was held under the chairmanship of Mr. D. A. S. Porteous at the Café Royal, London, W., last Saturday, attracted a larger gathering than ever. Community singing proved an enjoyable innovation.

The E.A.W.

The following arrangements have been made for the seventh annual conference of the Electrical Association for Women:—

Thursday, April 14th.—11.15 a.m.: Annual general meeting, Dorchester Hotel, Park Lane, London, W.1. 1 p.m.: Luncheon. Speakers: Lady Moir, O.B.E. (president, E.A.W.), the Viscountess Snowden, J.P., Mr. P. J. Pybus, M.P. (Minister of Transport), and Sir Hugo Hirst, Bt. Tickets, members 6s. 6d., non-members 7s., exclusive of wine. 3.15 p.m.: Reports from Local Branches. 8.30 to 10.30 p.m.: Reception by London Executive Committee at the Institution of Electrical Engineers; address by Sir Wm. Bragg, O.M., K.B.E., F.R.S., on "Modern Applications of X-Rays."

Friday, April 15th.—10 a.m.: All-day visit to Callender's Cable and Construction Co.'s works, and talk and demonstration on "From Grid to Home." 9 p.m. to 2 a.m.: Ball and Cabaret (in aid of New Premises Fund) at the Dorchester Hotel; £1 1s. (including supper).

Applications for tickets, &c., should be made as early as possible to the Directors, E.A.W. Headquarters, 46, Kensington Court, W.8.

About 200 members of the Birmingham and Midlands Branch of the Electrical Association for Women visited the Castle Bromwich section of the British Industries Fair on February 23rd. Mr. E. J. Jennings, the secretary and commercial manager of the Birmingham Electricity Supply Department, was in the chair and welcomed the visitors on behalf of the Fair Management Committee, while Mr. Walter Barrow extended a welcome on behalf of the Birmingham Chamber of Commerce. Mrs. Beale, the local E.A.W. president, and Miss C. Haslett, C.B.E., director of the Association, replied.

The first annual meeting of the Liverpool branch of the Association was held recently when Mrs. R. L. Burns presided in the absence of Mrs. F. C. Wilson, the chairman. The secretary, Miss R. Brown, reported that the membership had reached 92. Miss Haslett addressed the meeting and expressed her belief that the Liverpool branch would become one of the most flourishing sections of the Association. Mr. P. J. Robinson, city electrical engineer of Liverpool, also spoke.

Mrs. Wilson was elected president and Mrs. Burns chairman.

Mrs. H. S. Ellis (chairman), accompanied by 32 members of the E.A.W. Mid-Gloucester branch, visited Bristol on February 23rd to inspect the four E.D.A. electric demonstration houses organised by the Bristol E.D.A. Circle. The party were received by Mrs. H. R. Besant (chairman) and members of the Bristol branch, and by Mr. E. S. Osgood, chairman, Bristol E.D.A. Circle and Mrs. Osgood. The party were subsequently entertained to tea by members of the Bristol branch.

All-electric Totalisator at Preston

The latest all-electric totalisator at a greyhound race track in Lancashire will shortly serve racegoers at Preston dog track. The equipment has been manufactured, and the installation will be carried out by the Automatic Electric Co., Ltd., formerly the Automatic Telephone Manufacturing Co., Ltd., which in 1929 adapted its Strowger automatic telephone exchange apparatus to "tote" requirements, and was responsible for the installations at Newmarkt, Ascot, Birmingham, Wolverhampton, Cheltenham, Leicester, and Pontefract, &c.

The Acregate Lane "tote" is a replica of the larger equipments, adapted for dog-racing, and the installation comprises ticket-issuing machines, lamp monogram main indicators, a central control board, and the associated mechanism which registers every bet electrically and adds it to the totals displayed on the indicator in the small fraction of time before the ticket is issued. The ticket-issuing machines are equipped with keys similar to those of a cash register and each machine has an electro-mechanical lock, operated from the central control board; the responsible control officer can thus supervise the issue of tickets at all parts of the course, as all machines cease to function when this lock is operated. The indicator units are of the lamp monogram type, displaying the various numerals as selected groups of lamps, in a nest of 24 to each unit, and so placed as to form the required numerals when illuminated.

New Australian Transformer Standard

The Australian Standards Association has issued a new standard specification for the electrical performance of transformers for power and lighting. It is based on the specifications of the International Electrotechnical Commission and the British Standards Institution, the provisions of which were modified to meet Australian conditions after consultation with Australian users and manufacturers. The technical requirements of transformers of the polyphase, single phase, and autotype for power and lighting systems are covered by the new specification.

Appointments Vacant

Two area sales managers for the North Metropolitan Electric Power Supply Co.

Four clerks for Battersea Borough Council.

(See our advertisement pages to-day.)

I.E.E. Scottish Centre

The Committee of the Scottish Centre of the I.E.E. has nominated the following members to fill the vacancies which will occur on September 30th: chairman, Mr. D. H. Bishop; vice-chairman, Mr. G. D. Sharp; hon. secretary, Mr. Joseph Taylor; ordinary members, Professor F. G. Baily, Messrs. N. C. Bridge, W. S. Cooper, and A. E. McColl.

Our Personal Column

Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements

Mr. W. A. Gillott, A.M.I.E.E., has resigned his position as manager of Modern Electric Homes, Ltd. (associated with the British Electric Transformer Co., Ltd.), and this week he joined the English Electric Co., Ltd., as sales manager of that company's new Domestic and Heating Section at their Bradford works. Mr. Gillott's experience in electric cooking and heating has embraced all branches over the past 25 years. During the fifteen years he was with the Newcastle-upon-Tyne Electric Supply Co., Ltd., he handled cooking installations of all descriptions from domestic, up to restaurant and canteen installations of some 350-kW capacity. He was retained in an advisory capacity by the Ministry of Food, National Kitchen Division, during the War to control the design and installation of electric cooking appliances in National Kitchens throughout the country.

Elliott & Fry

Mr. W. A. Gillott, who has just joined the English Electric Co.

He also investigated the possibility of electric cooking on trains, and as a result of his suggestions and designs, several trains have been equipped and running some eight or ten years. He was sales engineer to the Jackson Electric Stove Co. from 1921 to 1923, after which he took up advisory work upon cooking and heating development and several electricity supply authorities utilised his services.

During the last few years his attention has been concentrated upon the development of all-electric homes and electric cooking and heating equipment for hotels. Mr. Gillott has read three papers on this subject before the I.E.E., one of which was awarded a special premium.

At the English Electric Co.'s works Mr. Gillott has rejoined an old colleague, **Mr. Frank Smith,** who is technical adviser to the company on domestic heating problems. Mr. Smith was for about twelve years works manager and technical adviser to the Jackson Electric Stove Co., Ltd., and his experience of electric cooking and heating dates back to the early days of cooking with the late Dr. S. Z. de Ferranti—a period of some twenty-five years.

Mr. J. Snow Huddleston, the secretary of the Association of Ex-Siemens Men, informs us that the Association has compiled a list of qualified electrical and mechanical engineers who are requiring appointments, and he will be pleased to supply information to employers in the electrical industry who need specialised men.

Mr. H. J. Taylor, of Glasgow, has been elected president of the Electrical Power Engineers' Association for the ensuing year. The senior-vice chairman is Mr. D. J. Duffy, but owing to illness he has been prevented from succeeding to the chair. In the annual message in the February issue of the *Electrical Power Engineer* the new president appeals to members to continue to help in maintaining the high standard which the Association has reached in the electrical industry. He refers to its many activities and points out that it has done more for its members in its comparatively short life than any other protective organisation. The new E.P.E.A. president is an Associate Member of the Institution of Electrical Engineers.

Mr. H. J. Taylor, the new president of the Electrical Power Engineers' Association

At the annual meeting of the South African Institute of Electrical Engineers in Johannesburg **Mr. A. T. Rodwell** was installed as president in succession to **Mr. A. M. Jacobs.** In his valedictory address Mr. Jacobs said that the large attendance at the Faraday Centenary celebrations encouraged him to hope that it might be possible to inaugurate an annual series of popular lectures on scientific and technical subjects.

Sir Robert A. Hadfield was elected president of the Engineering Golfing Society at the annual meeting held in London on February 25th.

Mr. Thomas Chalder has retired after nearly 32 years' service in the transport department of the Newcastle-on-Tyne Corporation. He had been traffic superintendent since 1925.

Mr. F. Madge was presented with a gold watch at the annual dinner of the Cardiff branch of the E.C.A. last week, upon the occasion of his retirement. Mrs. Madge received a pair of cut-glass vases.

Major P. A. Smith, O.B.E., A.M.I.E.E., chief engineer of Messrs. Drake & Gorham, Ltd., has been appointed joint managing director of the company. Major Smith, who was formerly an engineer with the County of London Electric Supply Co., Ltd., obtained the Order of the British Empire (Military Division) for valuable services during the war in connection with electrically controlled submarine minefields.

Major P. A. Smith, joint managing director of Drake & Gorham, Ltd.

Mr. G. H. Taylor, district telephone manager of the combined Edinburgh, Mid-Scotland, and Border district, has been appointed Controller of Sales (a new appointment) in the headquarters telephone staff in London. During his managership the Edinburgh telephone system was made automatic, and apart from his official work Mr. Taylor lectured to many public bodies on telephone questions. Mr. Taylor is a North of England man, and before coming to Scotland he served in Manchester and on the headquarters telephone traffic staff.

Mr. John McDonald, formerly Postmaster-General of Northern Rhodesia, has arrived at Salisbury, Southern Rhodesia, to begin his duties there as manager of Imperial & International Communications, Ltd. The beam wireless station is expected to be ready for operation about the end of March.

Mr. J. G. Potts, borough electrical engineer of Bury, Lancs., has been granted six weeks' leave of absence in order to take a sea voyage for the benefit of his health.

Ilford Town Council has rejected a recommendation by the Electricity & Lighting Committee that the superannuation allowance to be granted to the retiring borough electrical engineer, **Mr. A. H. Shaw,** should be £412 per annum. The Staff Advisory Committee recommend that the allowance should be £309, and this has been passed by the Council.

Obituary

Mr. W. F. Haldane.—The death is reported at Malahide, Dublin, on February 23rd, of Mr. W. F. Haldane, who was for many years Irish manager of the British Thomson-Houston Co., Ltd. He was a native of the North of Ireland and had spent a number of years in Canada, and held a commission in the Canadian Army during the war. He was a well-known figure in electrical-engineering circles in the Irish Free State. The funeral took place at Armagh, and was attended by representatives of the company from London.

Mrs. H. R. Kempe.—We wish to express our deep sympathy with Mr. Harry Robert Kempe, M.Inst.C.E., M.I.E.E., M.I.Mech.E., in the loss that he has sustained by the death of his wife Helen Catherine, daughter of the late Major-General Byng, C.B. Mrs. Kempe passed away on February 23rd, aged 86 years, at their home, Lavethan, Brockham, Betchworth, Surrey. We are sure that a very large number of friends in the electrical industry, and particularly those associated with him during his long period of service at the G.P.O. as Electrician-in-Chief and in other capacities, will desire to join with us in these words of sincere condolence.

Mr. N. Rackstraw.—The death has occurred suddenly at the age of 43 years of Mr. Norman Rackstraw, of North Weald, Essex, who had been with Imperial and International Communications, Ltd., for 25 years; during the last thirteen years he was chief engineer at North Weald.

Mr. P. Adair.—The death occurred on February 16th, at his home at Upper Birtley, Brook, near Godalming, of Mr. P. Adair, for many years associated with Messrs. Philips Lamps, Ltd. He was very well known to a number of people connected with the motor and electrical industries all over the country, and at the time of his death was representing Messrs. Philips on the South Coast.

Financial Section

New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Changes, Transactions in Stocks and Shares

New Companies Registered

Alan Wright, Ltd.—Private company. Registered February 27th. Capital £100 in £1 shares. Objects:—To carry on the business of electrical and mechanical engineers, contractors for and dealers in all kinds of electrical, gas and oil heating apparatus and fires, &c. The first directors are:—A. Wright and K. Rotherham, addresses not stated. Solicitors: Wansbroughs, Robinson, Taylor & Taylor, Lion Chambers, Broad Street, Bristol.

V.G. Manufacturing Co., Ltd.—Private company. Registered February 24th. Capital £3,000 in £1 shares. Objects:—To carry on the business of manufacturers and merchants of technical porcelain, electrical insulating material, electricians, &c. The first directors are:—J. M. Blair, 5, Emanuel Avenue, Acton. W.3; F. M. Van Gelderen (permanent governing director and chairman); and three others. Registered office: 4, South Place, Moorgate, E.C.2.

Seabrook Batteries, Ltd.—Private company. Registered February 25th. Capital £100 in £1 shares. Objects:—To carry on the business of manufacturers of and dealers in batteries, wireless aerials and receiving and transmitting sets, &c. The directors are:—S. Wiseman, Endsleigh House, Endsleigh Gardens, Surbiton; and W. F. Koch, Baylis House Hotel, Slough. Registered office: 205/207, Bedford Avenue, Slough.

Astor Electric Lamps, Ltd.—Private company. Registered February 26th. Capital, £200 in £1 shares. Objects: To carry on the business of electrical, wireless and gramophone accessory manufacturers and merchants, &c. The directors are: H. Bloom, 15, Highbury Quadrant, N.5, and L. Bloom, 16, Mildmay Park, N.1. Registered office: 25, Norton Folgate, E.1.

Returns of Electrical Companies

Anglo-Portuguese Telephone Co., Ltd.—Particulars have been filed of debentures to secure £100,000 and a premium of 2 per cent. (in addition to £413,200 already registered), authorised by resolutions of February 1st and October 19th, 1927, May 1st, 1928, and February 9th, 1932, and covered by trust deed dated February 9th, 1932 (supplemental to trust deeds dated 1927 and 1928). The amount of the present issue is £100,000. The present debentures are charged on the property, assets, and undertaking charged by the deed of February 1st, 1927. Trustees: H. Allen and Second Consolidated Trust, Ltd.

Chester Electrical Co., Ltd.—Debenture dated January 29th, to secure £500, charged on the company's property, present and future, including uncalled capital. Holder: E. V. Price, 29, Upper Northgate Street, Chester.

Ultra Electric, Ltd.—Capital, £5,000 in £1 shares. Return dated December 16th, 1931. All shares taken up. £3,000 paid, £2,000 considered as paid. Mortgages and charges: Nil.

Grierson, Ltd.—Capital, £10,000 in 4,000 preference and 6,000 ordinary shares of £1. Return dated December 29th, 1931. 4,001 ordinary shares taken up. £4,001 paid. Mortgages and charges: Nil.

H.E.D., Ltd.—Capital £100 in 1s. shares. Return dated December 31st, 1931. 100 shares taken up. £5 paid. Mortgages and charges: Nil.

Robinson & Hands Electric Co., Ltd.—Capital £5,000 in 4,980 preference and 20 ordinary shares of £1 each. Return dated December 21st, 1931. 4,232 preference and 20 ordinary shares taken up. £4,252 paid. Mortgages and charges: Nil.

C. J. Plucknett & Co., Ltd.—Capital £20,000 in £1 shares. Return dated December 31st, 1931. 15,007 shares taken up. £7 paid. £15,000 considered as paid. Mortgages and charges: £3,000.

Ferranti, Ltd.—Capital £900,000 in 500,000 7 per cent. cumulative preference shares of £1 and 800,000 ordinary shares of 10s. each. Return dated October 19th, 1931. 396,166 preference and 600,000 ordinary shares taken up. £250,000 paid on 250,000 preference shares. £446,166 considered as paid on the remainder. Mortgages and charges: Nil.

Dean & Noble, Ltd.—Capital £1,000 in £1 shares. Return dated November 30th, 1931. All shares taken up. £1,000 considered as paid. Mortgages and charges: Nil.

Giljay, Ltd.—Capital £1,000 in £1 shares. Return dated November 30th, 1931. 975 shares taken up. £801 paid. £174 considered as paid. Mortgages and charges: Nil.

Read & Morris, Ltd.—Capital £2,000 in 1,200 shares of 1s. and 1,940 shares of £1 each. Return dated November 18th, 1931. 1,200 shares of 1s. taken up. £30 paid. £30 considered as paid. Mortgages and charges: Nil.

New Era Electrical Manufacturers, Ltd.—Capital £100,000 in 50,000 preference and 50,000 ordinary shares of £1 each. Return dated December 31st, 1931. 1,504 ordinary shares taken up. £1,504 paid. Mortgages and charges: Nil.

Consolidated Electrical Supplies, Ltd.—Capital £100,000 in £1 shares. Return dated December 31st, 1931. 3 shares taken up. £3 paid. Mortgages and charges: Nil.

Witton-James, Ltd.—Particulars filed of debentures not exceeding £14,000, authorised January 18th, charged on the company's undertaking and property, present and future, including uncalled capital, the amount of the present issue being £14,000.

Kinson Electrical Co., Ltd. (formerly B. & S. Electrical Co., Ltd.).—Mortgage debenture dated February 12th to secure £8,750, charged on the company's undertaking and property, present and future, including uncalled capital. Holders: Sloan Electrical Co.. Ltd.. 10/12. Golden Lane. E.C.1.

City Notes

The "Underground" Group.—The financial results of these companies were briefly given in our issue of February 19th, p. 292, and the combined annual meeting was held on February 26th, Lord Ashfield (chairman and managing director) presiding. In the course of his speech the chairman said that the undertakings maintained their position during the year under review until the close of the holiday season when the creeping paralysis in trade and industry led to a rapidly accelerating fall in the volume of traffic and a reduction in the number of passengers carried by 28 millions. Spread over the whole year, the fall was relatively small, amounting to 1.2 per cent., while the average receipts per passenger also fell by about one per cent. Directly and indirectly their companies, with their subsidiary and associated concerns, were responsible in 1931 for an aggregate traffic movement of 2,646 millions of passengers, which was 15 millions less than a year ago, a fall of less than one per cent. The traffic receipts of the common fund companies decreased by £291,000, but against this there was a decrease in expenditure of £244,000. The failures and delays in their railway service from all causes were 5½ per cent. less than in 1930, and 28 per cent. less than they were five years ago. In the current year the full burden of taxation, local and national, to be met by the common fund companies would be almost £1,800,000. By agreement with the Treasury they had cancelled the reconstruction of stations at King's Cross, Russell Square, Edgware Road, Post Office and Sloane Square, and reduced the amount of expenditure on works which was to rank for annual grants at the rate of 3 per cent. for a period of 15 years, to £8,672,000 in the aggregate. This revised programme would result in a saving in expenditure of nearly £1,000,000, and reduce the total capital sum to be spent to £10,880,000. Satisfactory progress was being made with the new extensions, and it was anticipated that the bulk of them would be brought into use during the year. Before they could resume their policy of expansion and development, they must wait until the volume of traffic to be carried in Greater London once more was restored to its old level and grew. The year under review showed little change in the position of the companies in the London and Suburban Traction group. The first substantial step was taken during the year to modernise and re-equip them and 17 miles of tramways on the London United system were abandoned and replaced by services of trolley buses. Indications showed that, with the improved and enlarged service worked, there had been increased traffic and reduced costs, sufficient at least to justify the fresh capital expenditure. The report and accounts were adopted.

The Telegraph Construction & Maintenance Co., Ltd., held its annual meeting on February 25th, the Earl of Selborne presiding. In presenting the report and accounts (ELEC. REV., February 19th, p. 293) the chairman said that in their specialised industry of submarine telegraphy they were dependent upon a flourishing and steadily growing increase of business communications requiring prompt attention from all parts of the globe, but the financial depression found the cable-owning companies with a larger carrying capacity than was necessary in the existing slackness of trade and not in immediate need of additional cables. The work during the year under review had been confined to a few maintenance repairs of existing cables. Ever since they made their first cable they had continuously improved their plant to meet every new requirement as it arose, but to maintain their efficiency meant the training and retention of a highly skilled staff and the possession of the best machinery, and that necessarily meant heavy overhead charges. Although they possessed large assets and ample reserves, their position was one of difficulty, as British cable companies who had been constant customers were now merged in the Cables and Wireless combination, and they had received no orders from them of any significance. During the earlier part of the year they received some important, and in the latter portion some smaller, foreign orders, but owing to severe competition the prices had not been sufficiently remunerative to give a profit. In his opinion the cable orders for the future were going to be important, but more intermittent than in the past. If this were so, it would be of great advantage to the shareholders to be amalgamated with a company which had other lines of business besides that of cables. The report and accounts were adopted.

Mather & Platt, Ltd., held their annual meeting on February 26th, when Mr. L. E. Mather (chairman), who presided, said that their production departments had all suffered from the world-wide depression. Reductions had been made in overhead charges, including reductions in salaries and wages from directors downwards. Additions had been made to keep their plant up-to-date. They had secured a larger volume of business from Soviet Russia, chiefly for electrical and pumping plant, and these orders were obtained in competition with foreign firms. Satisfactory progress was being made in their new department for the manufacture of process machinery for the canning industry. The current year had commenced better than last year as far as their order book was concerned. The report and accounts were adopted.

The English Electric Co., Ltd., reports a trading profit for the year ended December 31st last of £209,394, as compared with £2,857 in the preceding year. After deducting debenture interest, &c., and a debit balance of £31,612 brought in, there is a credit balance of £2,474, which is carried forward. The report states that in consequence of their appointments in the National Government, Sir Edward Hilton Young and Mr. P. J. Pybus resigned their directorships. The present directors of the company are: Sir Holberry Mensforth (chairman), Col. Wade Hampton Hayes, Lord Meston, Messrs. F. Massingberd Rogers, P. Horsfall, V. Watlington, A. Winterbottom, and G. H. Nelson (managing director). Meeting: March 3rd.

The Northampton Electric Light & Power Co., Ltd., held its annual meeting on February 26th, Mr. F. H. Thornton (chairman) presiding. In presenting the report and accounts (ELEC. REV., February 26th, p. 329), the chairman said the sale of electricity for the year under review had risen by 6½ million kWh to 44½ millions, and the average price obtained was 1.30d. against 1.36d. in preceding year. The h.p. lines had been extended by 95 miles, making a total of 364 miles, and the l.p. mains by 49 miles, making a total of 251. The construction of a 33,000-V transmission line from Northampton to Buckingham was nearing completion. There had been a large increase in the amount of electricity sold in bulk to associated companies and to the Central Electricity Board. Consumers had increased by over 4,000 during the year. Extensions to the head offices had been completed and new offices and showrooms opened at Daventry and Winslow. The report and accounts were adopted, and, at an extraordinary meeting which followed, a resolution was carried increasing the capital to £1,000,000 by the creation of 300,000 additional ordinary shares of £1 each. An immediate issue of 100,000 ordinary shares will be made to ordinary shareholders at 31s. per share in the proportion of 16 new shares for every 100 shares held.

The Midland Counties Electric Supply Co., Ltd., reports that the trading profits of the undertakings owned and operated by it amounted to £402,139 for 1931, as compared with £376,963 in 1930, out of which £118,200 has been appropriated for depreciation and reserves. The balance on revenue account, including £5,067 brought in, is £276,665. It is proposed to pay a final ordinary dividend at the rate of 9 per cent. per annum, making 7 per cent. for the year, less tax (same), and to carry forward £5,478. The report states that substantial additions to the power companies' mains and transmission lines were effected during the year and large extensions of the generating plant are now in progress. Supplies were afforded in many new districts, additional bulk supply contracts were entered into with local authorities and a considerable number of industrial and domestic consumers were connected. A section of one of the traction properties was converted during the year to the railless-car system and a further section will shortly be similarly converted. When this is accomplished the whole of the traction properties will be operated either by railless cars or buses.

The Clyde Valley Electrical Power Co. reports a profit of £318,228 for the year ended December 31st last, as compared with £369,670 in the preceding year, to which is added £88,430 brought in, making £406,658. Contingency fund receives £110,000, the staff benevolent fund £10,000, and it is proposed to pay a final ordinary dividend of 4 per cent., making 7 per cent. for the year, leaving £81,658 to be carried forward. The report states that the reduced receipts are due to the depressed condition of trade, which was felt severely in the company's area. The distribution system was extended during the year by the addition of 50 miles of cables and overhead lines and 22 sub-stations. Standardisation of frequency is being proceeded with, and it is hoped that by the autumn of the current year the whole system will be operating at 50 cycles. A supply of electricity has been introduced at Carstairs Junction, Houston, Kilbarchan, Lesmahagow, Neilston, Nerston, Strathaven and Lymington. The death of Mr. J. Mackenzie, a director, is recorded. Meeting: March 15th.

Enfield Cable Works, Ltd., reports a profit for the year ended December 31st last of £135,726, as compared with £173,718 in the previous year, to which is added £34,333 brought in, making £170,059 available. After deducting depreciation and a loss on withdrawal of the company's balances in Australia (£32,959), it is proposed to pay a final dividend of 15 per cent., less tax, on the ordinary shares, making 25 per cent. for the year (same) and to carry forward £2,011. The report states that the results for the year would have been very satisfactory, in view of the world-wide depression in trade that has prevailed during the year, had it not been for the loss incurred in connection with the withdrawal of the company's balances in Australia. This item will not recur. The reserves and cash position are strong, and apart from this loss the dividend would have been fully earned. Dr. Edward Bowden has been appointed a director. Meeting: March 11th.

Chiswick Electricity Supply Corporation, Ltd.—The annual meeting was held on February 29th, Mr. H. Kahn (chairman) presiding. In presenting the report and accounts (ELEC. REV., February 26th, p. 329), the chairman said that the revenue for the past year was affected by the reduction in the price of electricity under an Order which came into force on July 1st, 1930. The electrical energy sold increased by 426,643 to 4,556,807 kWh, and the number of consumers by 530 to 7,705. Regarding their Chiswick undertaking, the contract under which they received a bulk supply was coming to an end and a new contract was being drafted under which they would receive a greater supply and at a lower rate. This would enable them to reduce the charges to consumers.

The Electrical Distribution of Yorkshire, Ltd., held its annual meeting on March 1st, Mr. R. W. Wickham (chairman) presiding. In presenting the report and accounts (ELEC. REV., February 26th, p. 329), the chairman said that the number of consumers was now 48,521; in the last four years they had connected 28,032 premises. The field of usefulness of domestic electrical appliances was steadily broadening. The increased consumption of electricity through the installation of these appliances automatically reduced the price per kWh under the residential staff, which was growing more popular every day. They had acquired the Mid-Cumberland undertaking. The Mid-Cumberland Electricity Order authorised the supply of electricity in an area containing a population of 85,000, and arrangements were being made to commence a supply in the current year. The report and accounts were adopted.

The Kensington & Knightsbridge Electric Lighting Co., Ltd., reports a net profit of £51,678 for 1931, as compared with £66,491 in 1930, to which is added £911 brought in, making £52,589. The preference dividend and the standard ordinary dividend (1s. 7.1811d.) are paid, special reserve receives £16,621, and £5,093 is appropriated to co-partners. The connections during the year increased from 41,278 to 44,145 kW, and sales of electricity from 23,332,420 to 28,008,169 kWh. Meeting: March 10th.

The Metropolitan Electric Supply Co., Ltd., reports a gross revenue of £1,124,493 for 1931, as compared with £1,113,240 in the preceding year, and a net revenue of £417,256. To this is added interest on investments, &c., and £111,052 brought in making £601,451 available. After providing for interest charges, &c., it is proposed to pay a final dividend of 7 per cent., making 10 per cent. for the year (same), leaving £101,180 to be carried forward. Meeting: March 8th.

The Charing Cross Electricity Supply Co., Ltd., has recommended a final dividend on the ordinary shares of 10 1-16d. per share, making the standard dividend for the year. Meeting: March 23rd.

The City of London Electric Lighting Co., Ltd., has declared a final dividend of 5 per cent., making 10 per cent. for the year (same).

The Globe Telegraph & Trust Co. states that the income is insufficient for it to pay an interim ordinary dividend on March 31st.

The London Electric Supply Corporation, Ltd., has declared a final dividend of 5 per cent. on the ordinary shares, making 9 2/15 per cent. for the year, less tax.

The County of London Electric Supply Co., Ltd., has recommended a final dividend of 7½ per cent., less tax, on the ordinary shares, making 10½ per cent. for the year (11 per cent. in 1930).

The Bournemouth and Poole Electricity Supply Co., Ltd., proposes to pay a final ordinary dividend of 9 per cent., making 15 per cent. for the year (same).

The South Metropolitan Electric Light & Power Co., Ltd., has recommended a final ordinary dividend of 6 per cent., less tax, making 9 per cent. for 1931.

The South London Electric Supply Corporation, Ltd., has announced a final dividend on the ordinary shares of 5½ per cent., less tax, making 8½ per cent. for the year.

The Newcastle-upon-Tyne Electric Supply Co., Ltd., has announced a final dividend of 3½ per cent., less tax, on the ordinary shares, making 6 per cent. for the year (same).

The Marconi International Marine Communication Co., Ltd., has announced a final dividend of 5 per cent., making 10 per cent., less tax, for 1931 (against 15 per cent. for 1930).

The Richmond (Surrey) Electric Light & Power Co., Ltd., is to pay a final ordinary dividend of 7 per cent., less tax, making 11 per cent. for 1931.

Waste Heat & Gas Electrical Generating Stations, Ltd., have announced a final dividend of 5½ per cent., making 8 per cent. for the year (same).

Stocks and Shares

TUESDAY EVENING.

THE financial feature of the moment is outstandingly the strength of gilt-edged securities. There has been a rush to buy British Government stocks, in consequence of the reduction to 5 per cent. in Bank Rate, coupled with the prospect of a further fall during the current month. Foreigners have been buying British stocks and supplementing, by their purchases, the home money removed from deposit at the banks, to be placed into British securities for the sake of safety and possible appreciation in view of the revived talk of early conversion in connection with the five per cent. War Loan. New issues have been taken avidly, and the appetite of the investor is such at the moment as to make it practically certain that a number of further offers of stock from responsible borrowers will be made in the early future. The course of prices can be well illustrated by reference to the movements in Central Electricity 5 per cent. scrip recently issued at 95. Underwriters were left with a substantial slice of the stock, the price of which fell to 2¼ discount. In the rush for gilt-edged securities, the stock naturally attracted attention, and the discount has been turned into a premium of 2¼ points. Other similar stocks are in active request. Central Electricity 4½ per cent. debenture has risen 5¼ points to 90. London and Home Counties debenture advanced 4 points, to the same figure. In the rush for these stocks, Home Railway prior charges have generally participated. A new issue of £2,000,000 District debenture stock will probably be out before the end of this week.

London Power Straddle

The attention of some of the holders of 5 per cent. conversion stock has been drawn to the suggestion that they might sell this, in view of the rise which has taken place to 105¼, and replace it with London Power 5 per cent. debenture stock. The next interest payment on the latter is due at the beginning of April, a month earlier than that on the conversion stock. London Power debenture can be bought at 101½ or thereabouts. It is redeemable between 1952 and 1972 by means of a 1 per cent. cumulative sinking fund. Ten London electricity supply companies guarantee the interest, which makes the security as nearly absolute as possible, but, unlike the conversion stock, the London Power debenture is not eligible for trustee investment, nor has it the cachet which attaches to a British Government security.

Home Electricity Supply

Most of the dividends for the final half of 1931 have now been declared by the London electricity supply companies. In the majority of cases these announcements repeat the rates of the preceding twelvemonth. The County of London Electric Supply Company has reduced its dividend ½ per cent. to 10½ per cent. by a declaration of a final dividend of 7½ per cent., as against 8 a year ago. This was a little unexpected,

and the price of the shares gave way a florin. The Metropolitan Electric's report shows a net revenue of £417,256, an advance over the previous year's figures. On the increased capital, as compared with a year ago, the same dividend as that for 1930 is announced.

Provincial and Suburban

In the provincial group, the Bournemouth and Poole Electricity Supply Company is paying the same rate as last year, namely, a final of 9 per cent., making 15 per cent. for the year. The Richmond (Surrey) Company announces 7 per cent., to make 11 per cent., and Newcastle-on-Tyne 3½ per cent., making 6 per cent. for the year. Both are the same as the dividends declared for 1931. The Midland Counties Electric Supply Company has done well, and shows an increased trading profit for 1931. Clyde Valley has reduced its dividend, from 8 per cent., previously paid, to 7 per cent.

Shareholders in the electricity supply companies may be congratulated upon their investments having proved so satisfactory during a period which has been particularly trying for all industrial undertakings. It is a source of profound gratification that dividends should have been maintained in the way that they have during a period in which the great majority of other companies have had to reduce the distributions on their ordinary capital.

New Issues

The prices of the new issues of electricity shares are as follows:—

Brompton	24s. 9d.	London	26s. 0d.
Chelsea	24s. 6d.	Metropolitan ...	39s. 0d.
Charing Cross...	27s. 0d.	Westminsters ...	25s. 3d.

Chelseas, London and Metropolitans are all slightly higher on the week. The Northampton Company is offering its proprietors 100,000 new ordinary shares of £1 each at the price of 31s. per share. The proportion is sixteen new shares for every 100 old shares held. It may be recalled that this time last year the company issued 77,500 new ordinary at 32s. 6d. The new shares are quoted at a premium of 7s. 6d., which is, mathematically, a shade too high in relation to the previously existing issue.

Home Railway Stocks

At the annual general meeting of the Underground Electric Railways, Lord Ashfield, the chairman, spoke in a manner which was read as being somewhat on the pessimistic side. The result is seen in a fall of 1s. to 18s. 6d., ex dividend, in the price of the shares. Districts are maintained at 54½, and Metropolitans 35½. To those curious in such matters it will be of interest to observe that District ordinary stock, once the Cinderella of the home railway group, now stands higher than any of the other active stocks in the same market. Time was when few people had a good word to say for Districts, but the present position shows how financial matters may be changed when force of circumstances coupled with shrewd management work hand in hand.

Cables and Wireless

Slight improvements have occurred in the prices of Cables and Wireless preference and "A" ordinary stocks. According to whispers in the market, the forthcoming Report by the Commission, appointed to look into the Combine's business, will be unexpectedly satisfactory. Globe Telegraph and Trust preference fell a further 5s., this lowering the price to 6½. The ordinary shares are 10s. down at 5½. Anglo-American Telegraphs are better. Of the dollar stocks, American Telephone & Telegraph at 185 are 5 down. International Telephones are a little easier at 15½.

Manufacturing and Equipment

There is a decidedly better tendency in the market for stocks and shares in this group. Henleys advanced to 5¼, and Johnson & Phillips to 23s. 9d. No changes have taken place in Associated Electrical Industries, General Electric ordinary are 6d. higher at 21s. 8d., and the 6½ per cent. preference shares have hardened to 23s. 6d. English Electric ordinary and preference spurted upon the appearance of an unexpectedly good report, the company showing a very substantial recovery in earnings. The prices of both classes of shares advanced to 8s. 9d. Ever-Ready ordinary are a few pence better at 21s. 9d. Siemens show no change at 21s. 3d.

In the iron, steel and kindred group, Babcocks held their prices at 43s. 9d. Vickers have fallen 1s. to 7s. 3d. upon fears that the dividend, the announcement of which is due to be made this month, may be passed.

Enfield Cables are a firm market at 3¾. The accounts show a drop of about £38,000 in the profits for the year, due to a non-recurring loss in connection with Australian balances, and the directors have decided in the circumstances to maintain the same rate of dividend as before, namely, 25 per cent.

B.E.T. Fireworks

The most spectacular movement recorded in this week's price lists is a jump of 150 points in British Electric Traction deferred. Other stocks of the company went higher, but less dramatically. Half a dozen bargains in the deferred stock are sufficient to move the price by 50 points.

Share List of Electrical Companies

	Nom.	Approx. Dividend. 1930.	1931.	Price. Mar. 1.	Rise or Fall.	Yield p.c. £ s. d.
HOME ELECTRICITY COMPANIES						
Bournemouth and Poole	1	15	15	59/6	+⅛	5 0 10
Brompton Ordinary	1	8½	8½	26/–	—	5 7 8
Central Electricity 4½% Deb.	Stock	4½	4½	91	+5½	4 19 0
Charing Cross Ordinary	1	8½	8½	28/6	—	4 18 3
Chelsea	1	8½	8½	25/6	—	5 9 10
City of London	1	10	10	35/9	+9d.	5 12 0
Clyde Valley	1	8	7	28/9	—	4 17 0
County of London	1	11	10½	42/6	–2/–	4 18 10
Edmundsons' 7% Pref.	1	7	7	23/6	—	5 19 2
Elec. Dis. Yorkshire	1	9	9	32/6	+6d.	5 10 9
Elec. Supply Corporation	1	11	—	42/6	—	5 3 6
Kensington Ordinary	1	8	8	29/–	—	4 16 7
Lancs. Light and Power	1	6½	—	23/9	—	5 7 9
London & Home Counties 4½% Deb.	Stock	4½	4½	91	+4	4 19 0
London Electric	1	9	9	27/–	—	5 3 8
Metropolitan	1	10	10	39/6	—	5 1 3
Midland Counties	1	7	7	28/3	+⅛	5 3 8
Mid. Elec. Power	1	8	—	27/6	—	5 16 5
Newcastle-on-Tyne Ordinary	1	6	6	24/6	+⅛	4 18 0
Do. 7% Pref.	1	7	7	26/–	—	5 7 8
Northampton	1	10	10	38/3xd	—	5 4 7
Notting Hill 6% Pref.	10	6	6	10½	—	5 14 3
North Met. Elec. 6% Pref.	1	6	6	23/–	—	5 4 4
St. James' and Pall Mall	1	8	8	29/–xd	+1/–	4 16 7
Scottish Power	1	8	—	27/–	—	5 18 5
South London	1	8½	8½	25/6	—	5 9 8
Urban Ordinary	1	7	—	27/–	—	5 3 8
Westminster Ordinary	1	8½	8½	25/6xd	—	5 9 10
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	22/–	+1/–	6 16 4
Yorkshire Elec.	1	8	8	32/6xd	—	4 18 6
HOME RAILS						
Central London Ord. Assented	Stock	4	4	66½	—	6 0 1
Metropolitan	„	4	3½	35½	—	9 17 2
Do. District	„	5	4½	54½	—	8 5 2
Underground Electric	1	8	7	18/6xd	–1/–	7 11 4
TELEGRAPHS AND TELEPHONES.		1929.	1930.			
American Tel. & Tel.	$100	9	9	185	—	4 17 3
Anglo-Am. Tel. Pref.	Stock	6	6	92	+2	6 10 5
Do. Def.	„	1½	1½	21	—	6 19 6
Cables & Wireless 5½% Pref.	„	5½	5½	46½	+2	—
Do. A 7½% Ord.	„	Nil	—	15	+2	—
Do. B Ord.	„	Nil	—	9½	—	—
Globe Tel. and T. Ord.	10	10	8½	5½	–½	—
Do. do. Pref.	10	6	6	6½	–½	9 4 8
Great Northern Tel.	10	20	20	22½	—	8 18 0
Marconi-Marine	1	15	15	31/3	—	9 12 0
Oriental Telephone Ord.	1	12	12	2⅛	—	*5 16 0
HOME AND FOREIGN TRAMS, ETC.						
Anglo-Arg. Trams First Prcf.	5	5½	—	6/3	—	—
Do. do. 2nd Pref.	5	6	—	3/9	—	—
Do. do. 5% Deb.	Stock	5	5	16¼	—	—
British Electric Traction Def. Ord.	„	5	5	875	+150	—
Do. do. Pref. Ord.	„	8	8	112½	+2½	7 2 3
Brazil Traction	100	8	—	18½	+½	5 9 7
Brit. Columbia Elec. Rly. Pce.	Stock	5	5	82½	—	6 1 5
London & Sub. Trac. 5% Pref.	1	Nil	Nil	7/–	—	—
London United Tram Deb.	Stock	4	4	55½	—	7 4 2
Mexico Trams, 5% Bonds	—	5	5	35½	—	14 1 8
Mexican Light Common	100	Nil	Nil	22½	—	—
Do. 7% Pref.	100	7	7	30½	—	22 19 0
Do. 1st Bonds	—	5	5	62¼	—	8 0 0
Victoria Falls Ord.	1	15	15	56/3	+⅛	5 6 5
Yorkshire (West Riding)	1	Nil	Nil	6/3	—	—
MANUFACTURING COMPANIES						
Assoc. Elec. Ord.	1	6	6	21/3	—	5 13 0
Do. Pref.	1	8	8	26/3	—	6 2 0
Babcock & Wilcox	1	15	14	43/9	—	*6 7 10
British Aluminium Ord.	1	10	10	25/–	—	8 0 0
British Insulated Ord.	1	15	15	53/3	+2/–	5 12 9
Brush Ord.	Stock	10	5	60	—	8 6 8
Callender's	1	15	15	53/3	+2/–	5 12 9
Do. 6½% Pref.	1	6½	6½	22/6	—	5 15 5
Crompton Parkinson Ord.	5/–	30	30	18/9	—	8 0 0
Do. 8% Pref.	1	8	8	26/3	—	6 2 0
Edison-Swan 1st Pref.	1	7½	7½	23/3	—	6 9 0
Do. 5% Deb.	Stock	5	5	89½	—	5 11 10
Electric Construction	1	5	Nil	7/6	—	—
Enfield Cable Ord.	1	25	25	3¾	—	6 8 10
English Electric	1	Nil	Nil	8/9	+⅛	—
Do. do. Pref.	1	Nil	Nil	8/9	+⅛	—
Ever Ready	5/–	35	35	21/9	+3d.	8 1 0
Ferranti Pref.	1	7	7	20/9	—	6 15 0
G.E.C. Pref.	1	6½	6½	23/6	+6d.	5 10 8
Do. Ord.	1	14	10	42/6	+6d.	4 14 1
Henley's	1	30	30	5½	+¼	5 14 3
Do. 4½% Pref.	5	4½	4½	4½	—	5 9 1
India-Rubber	1	Nil	Nil	5/9	—	—
Johnson & Phillips	1	10	10	23/9	+⅛	8 8 5
Siemens Ord.	1	7½	7½	21/3	—	7 1 2
Telegraph Construction	12	10	7½	10	—	—

* Dividends paid free of Income Tax.

Published Specifications

COMPILED expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specifications will be printed and abridged, and all subsequent proceedings will be taken.

1930

23,255. "Radio amplifying circuits." Johnson Laboratories, Inc. August 26th, 1929. (366,475.)

24,055. "Electrical non-metallic resistors, and the manufacture thereof." Globar Corporation. August 17th, 1929. (366,605.)

25,879. "Stator cores for dynamo-electric machines." Constructions Electriques de Belgique Soc. Anon. April 2nd, 1930. (366,492.)

25,919. "Electric service fuse boxes or cut-outs." L. Lomax and W. E. G. Dean. August 30th, 1930. (366,493.)

26,592. "Electric transformers." British Thomson-Houston Co., Ltd., and C. G. Mayo. September 5th, 1930. (366,512.)

29,317. "Stators for dynamo-electric machines, and methods of making the same." W. H. Scott, P. A. H. Mossay, and G. J. Scott. September 30th, 1930. (Cognate application 37,812/30.) (366,464.)

29,318. "Rotors for dynamo-electric machines and methods of making the same." W. H. Scott, P. A. H. Mossay, and G. J. Scott. September 30th, 1930. (366,465.)

29,394. "Form of slot for the armatures of direct current dynamo-electric machines with variable circumferential velocity or load." J. Pintsch Akt.-Ges. October 4th, 1929. (366,497.)

29,568. "Telephone systems." Automatic Telephone Manufacturing Co., Ltd., C. E. Beale, and R. Taylor. October 2nd, 1930. (Cognate application 33,979/30.) (366,469.)

29,573. "Completely automatic control for electrically driven vehicles for single or group running." Suddeutsche Eisenbahn-Ges. October 2nd, 1929. (366,515.)

31,847. "Keyboard operated telegraph apparatus." Creed & Co., Ltd., R. D. Salmon, and S. E. Kirk. October 23rd, 1930. (366,471.)

32,247. "Permanent magnets." Ferranti, Ltd., and F. H. Batt. October 27th, 1930. (366,518.)

32,505. "Insulation of electrical conductors." A. Carpmael (I. G. Farbenindustrie Akt.-Ges.) October 29th, 1930. (366,502.)

32,540. "X-ray apparatus." British Thomson-Houston Co., Ltd. November 4th, 1929. (366,473.)

32,784. "Electromagnetic relays and like apparatus." E. S. Cluderay and Radiovisor Parent, Ltd. October 31st, 1930. (366,558.)

32,852. "Vacuum electric tube devices and circuits employing same." E. Y. Robinson and Associated Electrical Industries, Ltd. October 31st, 1930. (366,485.)

32,940. "Arrangements for the evacuation of enclosed high voltage electrical devices." T. E. Allibone. November 1st, 1930. (366,561.)

33,033. "Electric circuit breakers." British Thomson-Houston Co., Ltd. November 1st, 1929. (366,506.)

33,053. "Electric switchgear." General Electric Co., Ltd., and F. J. Keeley. November 3rd, 1930. (366,490.)

33,087. "Electric motors." H. J. Heasman. November 4th, 1930. (366,566.)

33,173. "Process for regulating the frequency of alternating current producers." Siemens & Halske Akt.-Ges. February 17th, 1930. (366,534.)

33,234. "Electric current transformers." A. Reyrolle & Co., Ltd., and F. Coates. November 5th, 1930. (366,536.)

33,368. "Amplifying devices for high frequency signalling currents." Standard Telephones & Cables, Ltd. (M. C. Tournier). November 6th, 1930. (366,568.)

33,371. "Automatic or semi-automatic telephone or like systems." Standard Telephones & Cables, Ltd., E. P. G. Wright, G. C. Hartley, and W. J. Reynolds. November 6th, 1930. (366,569.)

33,413. "Piezo-electric crystal control systems." Kolster Brandes, Ltd. (Kolster Radio Corporation). November 6th, 1930. (366,572.)

33,433. "Processes for regulating the frequency of alternating current producers." Siemens & Halske Akt.-Ges. April 8th, 1930. (Addition to 366,534.) (366,573.)

33,437. "Synchronising systems." Electrical Research Products, Inc. December 4th, 1929. (366,575.)

33,506. "Electric switches." Akt.-Ges. Brown-Boveri et Cie. December 2nd, 1929. (366,584.)

33,545. "Vacuum tubes." Arcturus Radio Tube Co. November 11th, 1929. (366,590.)

33,576. "Electric lamps." D. E. Barnett. November 7th, 1930. (366,592.)

33,578. "Telephone systems." Automatic Telephone Manufacturing Co., Ltd., C. E. Beale, and R. Taylor. November 7th, 1930. (366,593.)

33,579. "Telephone systems." Automatic Telephone Manufacturing Co., Ltd., F. T. Belas, and G. T. Baker. November 7th, 1930. (366,594.)

33,580. "Switching mechanisms for use in telephone or like systems." Automatic Telephone Manufacturing Co., Ltd., and R. N. Saxby. November 7th, 1930. (366,595.)

33,581. "Telephone systems." Automatic Telephone Manufacturing Co., Ltd., R. Taylor, and C. E. Beale. November 7th, 1930. (366,596.)

33,582. "Electrical signalling systems." Associated Telephone & Telegraph Co. November 8th, 1929. (366,597.)

33,588. "Synchronising devices with a controlled oscillation generator especially for television apparatus." Fernseh Akt.-Ges. November 8th, 1929. (366,598.)

33,915. "Locking and interlocking arrangements for electric circuit closing devices." Siemens Bros. & Co., Ltd., and H. J. Broome. November 11th, 1930. (366,607.)

33,981. "Telephone sets." Automatic Telephone Manufacturing Co., Ltd., S. R. Smith, and H. J. Ellis. November 11th, 1930. (366,609.)

34,070. "Electric water heating receptacles." S. le F. Varvel. November 12th, 1930. (366,611.)

34,550. "Synchronous alternating current motors particularly for use in television or like systems." A. A. Waters and R. G. Wilson. November 17th, 1930. (366,622.)

35,088. "Methods of and apparatus for obtaining a low voltage source of electric power from high voltage electric transmission lines." Westinghouse Electric & Manufacturing Co. November 21st, 1929. (366,631.)

36,606. "Electric selectors." Siemens Bros. & Co., Ltd., and H. E. Humphries. December 4th, 1930. (Addition to 334,205.) (366,644.)

36,990. "Instruments for measuring the intensity of electrostatic fields." British Thomson-Houston Co., Ltd. December 28th, 1929. (366,649.)

37,413. "Automatic telephone systems." Siemens Bros. & Co., Ltd., and F. G. Tyack. December 11th, 1930. (366,653.)

38,214. "Means or indicating the liqfuid level in diving bells of dynamo-electric machines working under liquids." Siemens-Schuckertwerke Akt.-Ges. January 27th, 1930. (366,663.)

38,879. "Automatic telephone systems." Siemens Bros. & Co., Ltd., and R. G. Dixon. December 24th, 1930. (366,669.)

39,272. "Electric cables." Naamlooze Vennootschap Handelmaatschappij Cablon (Cablon Corporation). June 12th, 1930. (366,673.)

39,317. "Electric discharge tubes for emitting ultra-violet rays." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. February 12th, 1930. (366,675.)

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481. "Thermionic amplifiers." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. February 14th, 1930. (366,683.)

839. "Electric motors." British Thomson-Houston Co., Ltd., and A. F. Heinrich. January 9th, 1931. (366,686.)

1,063. "Conduits for electric cables subjected to fluid pressure." Naamlooze Vennootschap Handelmaatschappij Cablon (Cablon Corporation). June 3rd, 1930. (366,688.)

2,421. "Loud speaking telephones." Graham Amplion, Ltd., L. F. Laurence, and J. R. Beard. January 24th, 1931. (366,706.)

2,535. "Method of construction of electrical lines of constant mechanical tension." M. E. Mathieu. January 27th, 1930. (366,708.)

2,634. "Electric motors." E. A. Watson. January 27th, 1931. (366,710.)

2,872. "Apparatus for measuring characteristics of electric impulses." Ericsson Telephones, Ltd., and E. Robinson. January 29th, 1931. (366,711.)

3,320. "Electric switches of the multi-pole double-throw type." A. Heywood. February 2nd, 1931. (366,714.)

3,559. "Insulated flexible electric conductors or cables." Pirelli-General Cable Works, Ltd., and J. L. Bishop. February 4th, 1931. (366,719.)

4,158. "Electrical communication systems." Kolster-Brandes, Ltd. (Wired Radio Inc.). February 10th, 1931. (366,728.)

4,543. "Electrically heated apparatus." General Electric Co., Ltd., O. W. Humphreys and C. W. Stopford. February 13th, 1931. (366,732.)

7,062. "Electric torches." Elektrotechnische Fabrik Schmidt & Co., Ges. December 11th, 1930. (366,757.)

7,127. "Electric fires or radiators." A. Phillips, Ltd., and L. Phillips. March 7th, 1931. (366,759.)

7,296. "Electric meters." A. W. Mathys (Sangamo Co., Ltd.). March 9th, 1931. (366,763.)

7,626. "Apparatus for automatically feeding bulbs to sealing-in machines for the manufacture of electric incandescent lamps or similar closed glass vessels." General Electric Co., Ltd. March 13th, 1930. (366,765.)

9,658. "Method of and means for encasing pupin loading coils." Siemens & Halske Akt.-Ges. April 24th, 1930. (366,791.)

10,906. "Mounting of electrical insulators." Steatit-Magnesia Akt.-Ges. April 11th, 1930. (366,804.)

13,308. "Multi-core electric cables." Pirelli-General Cable Works, Ltd., and G. W. Giffin. May 5th, 1931. (366,823.)

15,007. "Inductance coils for wireless signalling apparatus." General Electric Co., Ltd., and N. J. McAinsh. May 21st, 1931. (366,834.)

15,170. "Wireless receiving apparatus." General Electric Co., Ltd., and W. H. Peters. May 22nd, 1931. (366,836.)

15,880. "Means for centring movable coils in electromagnetic apparatus." O. O. Kring. May 31st, 1930. (366,843.)

17,503. "Protective systems for dynamo-electric machines." British Thomson-Houston Co., Ltd. June 16th, 1930. (366,851.)

18,235. "Television transmission using ultra-short waves." M. Von Ardenne. June 25th, 1930. (366,856.)

18,737. "Electric cathode glow-discharge tubes having cold electrodes and a gaseous filling." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. July 26th, 1930. (366,861.)

19,734. "Electric cables." W. Brown. July 9th, 1931. (366,862.)

21,078. "Terminals." H. Knumann. July 28th, 1930. (366,869.)

24,143. "Radio receiving apparatus." British Thomson-Houston Co., Ltd. August 29th, 1930. (366,875.)

25,045. "Mercury-vapour rectifiers." Akt.-Ges. Brown-Boveri et Cie. September 22nd, 1930. (366,881.)

25,307. "Electric discharge tubes." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. September 27th, 1930. (366,883.)

30,221. "Wireless signalling systems." C. Lorenz Akt. Ges. November 4th, 1930. (366,891.)

Trade Mark Applications

THE following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from February 24th :—

EMF (lettering and design). No. 526,486. All goods in Class 6. No. 526,487. Class 13. Electric contacts, terminals, cut-outs, switches (ordinary) and electrodes for arc welding.—Electric Co. Proprietary, Ltd., North Carlton, Victoria, Australia. (English representative: S. Sokal, 1, Great James Street, Bedford Row, W.C.1.)

Pyrobest. No. 528,708. Class 8. Electric cables. No. 528,709. Class 50. Wire covered with asbestos or with a composition consisting principally of asbestos.—W. T. Henley's Telegraph Works Co., Ltd., 11, Holborn Viaduct, E.C.1.

Octozone. No. 528,182. Class 11. Instruments, apparatus and contrivances (not medicated) for surgical and curative purposes.—Electro-Colour Products, Ltd., 63, New Broad Street, E.C.2.

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Aberdeen.—Rebuilding photographic works; Miller Bros., Hall & Co., Ltd., Back Hilton Road.

Alton (HANTS).—Houses (52), for U.D.C.; G. H. Webb, surveyor.

Ashby-de-la-Zouch.—Wesleyan church, Moira (£4,000); Alfred Smith, builder, Derby.

Ashington (NORTHUMBERLAND).—Welfare institute; Miners' Welfare Committee.

Aspull (LANCS).—Memorial hall, for St. Elizabeth's Parochial Council; L. B. Barnish, architect, 58, Rodney Street, Liverpool.

Barking.—Development, Manor Farm Estate; J. R. Leftley. Furniture factory, River Road; H. Thomas & Co.

Beaminster (DORSET).—Houses (20); R.D.C. surveyor.

Birmingham.—Eight storey block of offices, Newhall Street and Great Charles Street; Essex & Goodman, architects, 21, Waterloo Street. Cinema, Warwick Road, Solihull; Bradley & Clark, architects, Cathedral Chambers, 10A, Temple Row.

Blackpool.—Hotel, Promenade and Beach Road, Cleveleys; J. B. Singleton, architect, 7, King George Avenue, North Shore.

Blacon (CHESHIRE).—Hotel; Bents Brewery Co., Ltd.

Blaydon-on-Tyne.—Houses (50), for U.D.C.; T. Mastaglio, surveyor.

Blyth.—Housing scheme, Bebside, for T.C.; L. Leeper, borough engineer.

Brighton.—Hotel, Rifle Butt Road and South Coast Road; Beard & Co. Hotel, Lewes Road, North Moulsecoomb; Kemp Town Brewery (Brighton), Ltd.

Burnlem.—Building estate, off Hogh Lane; Mr. Sambrook.

Cardiff.—Bazaar stores, Queen Street; Marks & Spencer, Ltd., 21, Chiswell Street, London, E.C.

Carshalton (SURREY).—R.C. church; Arnold, Fooks, Chadwick and Co., 60, Carey Street, W.C. Hotel, St. Helier Estate; R. G. Hollingbery.

Castle Eden (DURHAM).—Hotel, Deat Hill; J. Nimmo & Co., Ltd., Castle Eden.

Chester.—Houses (61), Whitchurch Road; J. Law.

Chesterfield.—Houses (38); R.D.C. surveyor.

Clacton-on-Sea (ESSEX).—Cinema, with flats, offices and shops, Pier Avenue; Ernest Johnson.

Coventry.—Infectious diseases hospital (£123,500); city surveyor.

Darlington.—Church, Pierrepoint (£5,000); Woodside Estates, Ltd., builders. Church; St. Matthew's Parish Council. Church; Greenbank Primitive Methodist Church Council.

Deaf Hill (DURHAM).—Hotel for J. Nimmo & Sons; C. F. Burton, architect, Shipping Chambers, George Street, West Hartlepool.

Dundee.—Houses (536); city architect. School for St. Joseph's R.C. church (£11,039); Allan & Friskin, architects.

Durham.—Schools, Lancaster, Stanley and Wheatley Hill; F. Willey, county architect, 34, Old Elvet. Institution for the mentally defective, for C.C. (£115,000); Rees & Holt, architects.

Edinburgh.—Vulcanite works for North British Rubber Co., Ltd., Castle Mills; F. E. B. Blane, architect, 25, Rutland Square.

Enfield (HERTS).—Rebuilding factory, Queensway; Percival Hart, Ltd.

Erith.—Sewerage pumping station (£6,384), for U.D.C.; H. Friday & Sons, builders.

Essex.—Schools, South Chingford, Ilford (£52,648), Basildon, Pitsea, Brentwood, and Dagenham (£38,120); director of education, Chelmsford. School, Rush Green (£9,500); Pollard and Skerritt, builders.

Exeter.—Sewage works (£76,236); H. Arnold & Sons, Ltd., Leeds.

Falkirk.—Reconstruction scheme, Meeks Road School (£4,149); architect, County E.C., Stirling.

Felling-on-Tyne.—Houses, near Felling Colliery; C. W. Hall, architect, Council Offices.

Gateshead-on-Tyne.—R.C. school (230 places); R. P. Howard, builder, Grange Road, Newcastle.

Hale (CHESHIRE).—Reconstruction, Unicorn Hotel; G. Graves and Ellerton, architects, 80, Mosley Street, Manchester.

Hampshire.—School, Hordle (£4,668) and public library, Eastleigh (£5,000); county clerk, Winchester.

Harrow-on-the-Hill.—Shops and flats, Kenton Road, and Woodcock Hill Lane, Kenton; T. F. Nash, Ltd. Cinema, Old Black Farm, Kenton Road, Kenton; F. Hammond. Flats (24), Kenton Road, Kenton; E. Wright.

High Wycombe (BUCKS).—Factory, West End Street; Bates and Son. Houses (14); High Wycombe and District Housing Society, Ltd.

Hornchurch (ESSEX).—R.C. school; Canon J. Van Meenen.

Huddersfild.—Houses (114); borough surveyor.

Ilford.—Shops (6), Lington Terrace, and houses (26), Wigmore Terrace; G. F. Seigerts.

Ilkley.—Factory, Addingham; Peltzer Lister Velvet Company, Addingham.

Irish Free State.—(BALLINA, CO. MAYO).—Church, Pulathomas; W. H. Byrne & Son, architects, 20, Suffolk Street, Dublin.

Irlam & Cadishead (LANCS).—Houses (100), for U.D.C.; H. Nurse, surveyor.

Jarrow-on-Tyne.—Houses (100); J. Scott-Weir, borough engineer, Town Hall.

Keighley.—Reinstatement of machine tool works (£20,000); Clark's Machine Tool Co., Ltd., Albion Works, Worth Village, Keighley.

Kent.—School, Hearn's Road, St. Paul's Cray; county E.C.

Kettering.—Houses (76), Pupers Hill, and rehousing scheme, Stamford Road; U.D.C. surveyor.

Langholm (CUMBERLAND).—Housing scheme; borough surveyor.

Leeds.—New Oakwood Telephone Exchange, Roundhay; H.M. Office of Works, King Charles Street, S.W.1.

London.—(CAMDEN TOWN).—Flats (800), Cumberland Market; H.M. Office of Works. (CAMBERWELL).—Butter packing factory, Farmers Road; Amalgamated Dairies, Ltd., Tooley Street. (HAMMERSMITH).—Factory, Riverside Wharf, for General Motor and Tyre Co. (£5,000); H. Welch.

Longbenton (NORTHUMBERLAND).—Houses (104); H. G. McNaught, surveyor, Council Offices. Houses (160), Forest Hall; U.D.C. surveyor.

Manchester.—Houses (1,746), Wythenshawe Estate; city architect. Elementary school, Fallowfield; city architect. Church for Rev. J. M. Routledge (£20,000); W. Telford Gunson & Son, architects, 10, Marsden Street.

Mansfield.—Licensed premises, Ravensdale Estate; Cook, Howard & Lane, architects, Brunt's Chambers, Leeming Street. Factory, Nottingham Road; Boneham & Turner, Ltd., Duke Street.

Middlesbrough.—Houses (212); S. E. Burgess, borough engineer.

Middlesex.—Airport, Yeoveney Manor; C.C. Nurses' quarters, Poor Law Institution, Hillingdon (£16,000); County Assistance Committee.

Mill Hill.—Public house, Daws Lane; Truman, Hanbury, Buxton & Co., Ltd.

Morecambe.—Development, Heysham Towers Estate; Unsworth & Babbage. Building estate, Outer Moss Lane; J. Thornton.

Musselburgh.—Mill extensions; Inveresk Paper Co.

Nelson.—Extensions, Reedyford Memorial Hospital.

Newbiggin (NORTHUMBERLAND).—Rebuilding C.W.S. premises; C.W.S. Architects' Department, 90, Westmorland Road, Newcastle.

Newcastle-on-Tyne.—Social club for Compovian Co., Ltd. (£10,000); William Smelt, builder, Milvain Estate. Alterations to Empire Theatre, Newgate Street; W. & T. R. Milburn, architects, 17, Fawcett Street, Sunderland. Stores and offices for Wm. Cochran-Carr, Ltd.; Cackett, Burns, Dick and MacKellar, architects, 21, Ellison Place. Houses (98); R. Roberts, architect, 18, Cloth Market.

Newent.—Houses (26); R.D.C. surveyor.

Northallerton (YORKSHIRE).—Housing scheme, Vicars Croft Estate, for T.C.; E. O. Hillyard, surveyor, Council Offices.

North Shields.—Houses, North Chirton Estate; Chisholm & Sons, builders, Upper Reed Street, North Shields.

Norwich.—Re-erection of shoe factory (electrically equipped); Barfield & Richardson, Botolph Street.

Oban.—Rebuilding of Royal Hotel, Tyndrum; proprietor.

Orrell (LANCS).—Houses (86); U.D.C. surveyor.

Orsett (ESSEX).—Houses (20); R.D.C. surveyor.

Patcham (SUSSEX).—Houses (38), Ladies' Mile Estate; George Ferguson & Son.

Perth.—School, Scone; master of works, education authority.

Peterborough.—Factory extensions and shopping centre; Brown, Son & Co., Broadway.

Preston.—Houses (87); borough surveyor.

Rawdon (YORKS).—Rebuilding Fox and Hounds Inn; Glendinning & Hanson, architects, Albany Chambers, 15, Commercial Street, Halifax.

Rickmansworth (HERTS).—Houses (52) for U.D.C.; A. Freeman, surveyor.

Romford.—Houses (32), Wennington Road and Lambs Lane, Rainham, for R.D.C.; W. J. Grant, surveyor, 16a, South Street.

Rushden (NORTHANTS).—Addition to boot factory, Station Road; B. Denton & Sons, High Street. Shops, Purvis Road; T. Swindall & Sons, builders, Station Road.

St. Helens (LANCS).—Black Bull Hotel, Greenall; Whitley & Co., Ltd., Wilderspool Brewery, Warrington.

Seaham Harbour.—Houses, Old Lane; U.D.C. surveyor, Council Offices.

Shipley.—Houses (69), off Westfield Lane; J. Cooper.

Slough.—Houses (50); Salt Hill Estates, Ltd. Houses (2,000); U.D.C. surveyor. Rebuilding Swan Inn; Nicholson & Sons, Ltd.

Southmoor (DURHAM).—R.C. church; F. Coyle, architect, 29, Newmarket Street, Consett.

Southport.—Schools, Birkdale, for Borough E.C.; Leonard Barnish, architect.

South Shields.—Houses (296), Egerton Road, for T.C. (£25,000); W. D. Allison, builders, Whitburn. Houses (80), Harton Green Lane; J. P. Watson, borough engineer.

Stirling.—Houses (244) for Corporation; Mr. Goudie, borough surveyor.

Stockport.—Additions to factory for E. Robinson & Sons, Ltd.; Peter Peirce & Son, architects, 30, St. Petersgate.

Stoke-on-Trent.—Greyhound racing track, Fenton Manor; Stoke City Greyhound Co.

Surrey.—School (384 places), Ewell, for County E.C.; W. W. Finny, secretary, Kingston-on-Thames.

Throckley (NORTHUMBERLAND).—Mission hall (£3,000); C. S. Errington, architect, 21, Grainger Street West, Newcastle.

Thundersley (ESSEX).—Factory, Kiln Road; J. Renvoize, Kiln Road.

Twickenham.—Flats (68), Meadowland site; H. W. Binns, architect. Flats (24) and houses (48), Ernecroft Estate; Middlesex County Architects' Department.

Ulverston.—Bazaar stores, Market Place; F. W. Woolworth & Co., Ltd., Kingsway. Spinning factory extensions, Morecambe Road; Ellers, Ltd.

Upton (YORKS).—Hotel; Carter's Knottingley Brewery Co., Ltd.

Warrington.—Houses (38), Westy Lane Estate; borough surveyor.

Washington (DURHAM).—Houses (150), Heworth Lane, for U.D.C.

Waterfoot (LANCS).—Rebuilding Black Dog Hotel, Crawshawbooth, for John Baxter, Ltd.; Butterworth & Duncan, architects, 2, Baillie Street, Rochdale.

Wembley.—Building estate, near Park Lane; A. J. Butcher.

Worthing.—Houses (50), Marlowe Road; S. Willmore Phillips & Co., builders, 26, Chapel Road. Houses, Richmond Road; F. Sandell & Sons, builders, 12, Warwick Road.